

INSIDE: AN ESSAY ON THE SUBURBANISATION OF THE WORLD

The Economist

DECEMBER 6TH–12TH 2014

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Technology Quarterly

Shinzo Abe's last chance

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WORLD WATER SUMMIT

In the wake of a looming water crisis, The World Water Summit was convened in London at The Crystal.

Fifty years after the publication of *Dune*, Frank Herbert's vision of a parched planet seems rather more than half a century closer to reality. Coherent plans to guarantee a continued water supply still barely register on the global agenda.

To find insights and answers, The Economist Events invited leaders to a World Water Summit. Co-sponsored by Ecolab and Monsanto, the London Summit examined the impact of global water scarcity and sanitation challenges on businesses and communities and identified how individuals, companies and countries might make better use of water resources.

HRH The Prince of Wales set the tone with a heartfelt dismissal of the 'business as usual' option. Jan Eliasson, Deputy Secretary of the United Nations, pursued the theme of compassionate 'hydro diplomacy' by asking the private sector to come together in a push to throw out silo thinking and the 'toilet taboo'.

Water Ministers from Mexico, Uganda and Singapore debated effective ways to drive national water policy against the background of trans-boundary issues, scant accounting data and fatalistic mindsets. Karl Lippert of global brewing concern SABMiller underlined the often-overlooked disconnect between rainfall and water availability. "Water is often in the wrong place, and polluted," he said. "Whole communities are being held back. Good partnerships with the private sector work for everyone."

Offering insights to help the private sector make the business case for more effective water management strategies, Ecolab's Christophe Beck urged industry to "change the way we frame the issues of water scarcity, putting water risks in financial terms to drive strategies that are environmentally sustainable, socially equitable and that make good business sense". The UN's Sustainable Development Solutions Director Guido Schmidt-Traub exposed the shortcomings in water mapping data, recommending more knowledge-sharing and a stronger commitment to the 2015-2030 Sustainable Development Goals programme.

Looking even further ahead, Monsanto's Kerry Preete saw 'big data' as the key to meeting the imperative of a 70 percent increase in global food production by 2050. "Adding acres is not sustainable," he said, prioritising greater precision and sustainability in agriculture and highlighting algorithm-driven analytics as the next big data breakthrough.

Industrialization and population growth is expected to double water consumption by 2025. Reconciling competing demands without risking serious public health issues was discussed, along with sustainable approaches to water, food and agriculture from the perspectives of biotech, aquaculture and faecal recycling.

In a debate on collaborative solutions to toilet access, Brian Arbogast of the Bill & Melinda Gates Foundation promoted the BMGF's project to invent a new, waterless and energy-positive toilet – a highly-investable 'sewage to gold' business model worth \$8 billion. A subsequent panel on ecosystem approaches to water 'beyond the nexus' saw Ecolab's Geoff Townsend encouraging local-level NGO engagement and the UN's Mette Wilkie calling for a more holistic, integrated approach including transport. Greg Koch of Coca-Cola accepted that the food/water/energy nexus was the defining challenge for mankind. "It's complex," he said. "Coca-Cola's route is through policy reform."

Rajendra Singh brought the Summit to a rumbustious conclusion with the story of his conversion from a medical doctor to a 'water Ghandi' after an elderly patient had asked him to return Rajasthan to the verdant paradise it had been before unsustainable development dried out aquifers. Using only community power, Singh organised a network of mini-dams. Now, the river is flowing again, and women can collect water in only five minutes rather than eight hours – a message of hope to usher in the UN's new set of Sustainable Development Goals, and a new, more connected approach to water usage and sanitation.


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On the cover

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to take part in "a severe contest between intelligence, which presses forward, and an unworthy, timid ignorance obstructing our progress."

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Next week

We publish our special report on luxury goods. The modern industry rests on a paradox of mass exclusivity—but is thriving nonetheless, says Brooke Unger

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Politics



Israel's parliament was dissolved and early elections called for March 17th, after the collapse of the governing coalition led by Binyamin Netanyahu, the prime minister. The government fell apart when Mr Netanyahu kicked out two moderates from his cabinet, Yair Lapid and Tzipi Livni, for, he said, plotting to throw him out of office. Both Mr Lapid and Ms Livni are opposed to a controversial proposed law that would favour Jewish rights over those of Arabs.

Somali insurgents belonging to the Shabab, an Islamist group, killed 36 workers at a quarry in **Kenya**. It is the latest attack in which non-Muslims have been singled out by the Shabab and executed. Kenya's president, Uhuru Kenyatta, replaced the interior minister and police chief and declared a "war against terrorists".

A court in **Egypt** sentenced 188 people to death for an attack on a police station near Cairo in which 14 police officers died. Just days before the ruling another court dropped charges against Hosni Mubarak, the president ousted during the Arab spring, relating to the deaths of protesters at the hands of the security forces in the dying days of his rule.

Bringing in the brains

Barack Obama was expected to nominate Ashton Carter as his next **secretary of defence**, replacing Chuck Hagel, who is stepping down. A former number two at the Pentagon, Mr Carter has decades of experience in defence policy and used to head Harvard's

Kennedy school. He will be the first defence secretary without any experience of being in uniform since William Cohen, who was in the job between 1997 and 2001.

A week after the Ferguson riots, protesters took to the streets of **New York** after a grand jury brought no charges against a white policeman who had applied a chokehold to a black man. Eric Garner died later; the New York medical examiner has ruled that his death was a homicide. The Justice Department has launched an investigation.

A federal appeals court delayed the execution in **Texas** of a convicted murderer who has schizophrenia. Scott Panetti's lawyers say he was diagnosed with a psychotic disorder long before he shot his in-laws. They want the Supreme Court to rule once and for all on the constitutionality of executing mentally ill convicts.

To the polls, again

Stefan Lofven, **Sweden's** prime minister, called new elections after parliament rejected his proposed budget. The Social Democrat had been in office for just two months, the shortest term of any elected prime minister in Swedish history. The far-right anti-immigrant Sweden Democrat party was the decisive block voting against the government.



Swiss voters overwhelmingly rejected referendum proposals to restrict immigration drastically and to force Switzerland's central bank to hold 20% of its assets in gold. A third proposal to drop some tax preferences for rich foreigners failed as well. More flexible immigration restrictions approved in a

referendum last February remain in place.

Ukraine's president, Petro Poroshenko, granted citizenship to three foreigners so that they can serve as ministers in the new government formed by Arseniy Yatsenyuk, the prime minister. Natalie Jaresko, a Ukrainian-American private-equity executive, is the new finance minister. Meanwhile, fighting flared between pro-Russia separatists and Ukrainian troops in eastern Ukraine's region of Donbas.

Three pro-Europe parties won a combined narrow majority in **Moldova's** parliamentary election, though a pro-Russia party got more votes than any other. Russia has pressured the impoverished country to join its Eurasian Customs Union. The European Union signed an association agreement with Moldova this spring.

Aiming for a fresh start

Brazil's president, Dilma Rousseff, named a new economic team to deal with deteriorating public finances, rising inflation and sluggish economic growth. The new finance minister, Joaquim Levy, helped trim the budget deficit during an earlier stint as a senior official. Alexandre Tombini remains head of the Central Bank, which raised its main interest rate by half a percentage point this week.

Colombia's left-wing guerrilla army, the FARC, released five captives whom it had abducted on two separate occasions, including a Colombian army general. The government and the FARC agreed to resume peace talks on December 10th; they had been suspended after the general's kidnapping.

Mexico's president, Enrique Peña Nieto, laid out a package of reforms to the police and justice system. They include putting state governments in charge of local police forces and giving the federal government the power to take over local governments that have been infiltrated by organised crime. Mr Peña has been the

target of public anger since the murder in September of 43 students in the state of Guerrero, allegedly by a drugs gang and the local authorities.

The last UN conference on **climate change** before next December's meeting in Paris—where a global treaty on carbon emissions is expected to be signed—began in Lima. The World Meteorological Organisation reported that 2014 could turn out to be the hottest year on record. It found that the global average air temperature over land and sea from January to October was 0.09°C above the average for the past ten years.

Seeking distance from Beijing



Taiwan's ruling party, the Kuomintang (KMT), was heavily defeated in local elections, including for the office of mayor in Taipei, the capital. Many voters were unhappy that the government's pursuit of closer ties and trade links with China had done little to help the economy. After the elections the prime minister and cabinet resigned and Ma Ying-jeou, Taiwan's president, quit as the KMT's chairman.

In **Hong Kong** hundreds of protesters, mostly students, clashed with police outside government offices. The three founders of the Occupy Central movement, which has organised the barricades and sit-ins on the city's streets to protest against mainland China's interference in elections set for 2017, turned themselves over to police, but were not charged. China, meanwhile, barred a group of British politicians from entering Hong Kong, saying it didn't welcome foreign intrusions into domestic affairs. ►►

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to be passed.*



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Go Further

Business

Oil prices continued to slide, following a plunge of 8% in Brent crude on November 27th in reaction to the decision by **OPEC** to maintain production at 30m barrels a day. Brent was trading around \$70 a barrel on December 3rd. Some OPEC member countries face a squeeze in their public finances and had pleaded for a cut in output in order to lift oil prices. But that was resisted by Saudi Arabia, which does not want to lose market share.

The Russian **rouble** fell the most in a single day since 1998, prompting the central bank to make its first intervention in support of the currency since letting it float freely in early November. Russia is reeling from the effects of the tumbling oil price and Western-imposed sanctions. The central bank spent \$30 billion propping up the rouble in the six weeks prior to its float.

Cheaper oil is good news for motorists, at least. **Gasoline** (petrol) was being sold at \$1.99 a gallon at a gas station in Oklahoma, the first time it has been below \$2 at the pump in America since mid-2010.

The "Google tax"

Britain said it would bring in a new tax on companies that **divert profits** out of Britain to avoid paying tax. It was not immediately clear how the levy would be implemented and whether it would fall foul of existing tax treaties.

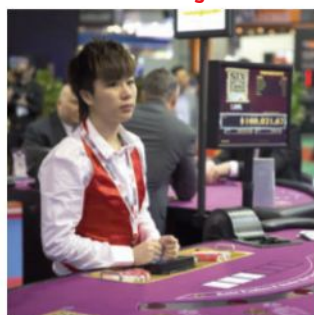
Moody's downgraded **Japan's** sovereign credit rating by one notch because of uncertainty over whether it can achieve its deficit reduction target with reduced tax revenue. Last month Shinzo Abe, the prime minister, postponed a second rise in the sales tax after the first increase was blamed by many for pushing the economy into recession.

E.ON, Germany's biggest power utility, decided to split in two, creating a new company that will house its renew-

able-energy and distribution-networks businesses, which will be separated from its power-generation, energy-trading and production divisions. It is doing this in response to "dramatically altered global energy markets".

Twitter streamlined its procedures for reporting abuse, and for the first time will allow users to stop trolls they have blocked from viewing their personal information.

How fortunes change



Revenue from gambling in **Macau** slumped by 20% in November compared with the same month last year. Gambling revenue in the Chinese territory has now fallen for six consecutive months, making it almost certain that this will be the first year to see a decline in takings since 2002. Part of the reason is China's crackdown on corruption, which has

deterred some of its super-rich from dealing with the informal "junkets", gambling enterprises through which many big spenders conduct their business at Macau's casinos.

Patrick Drahi, a French telecoms entrepreneur, rang up another success, as his **Altice** group started exclusive talks to buy the Portuguese assets of **Portugal Telecom** from Oi, its Brazilian owner. Altice raised its offer to €7.4 billion (\$9.2 billion), beating a rival bid from private-equity firms. Altice recently completed its acquisition of SFR, a mobile operator in France.

American shoppers spent 11% less in total over this year's **Thanksgiving weekend** than they did last year, according to the National Retail Federation. Many stores and websites started offering steep discounts after Halloween, making "Black Friday" less compelling. This was not the case in Britain, which has adopted the Black Friday theme with gusto. John Lewis, a department-store chain, had its best-ever sales week, selling one tablet computer every second.

Kalashnikov rebranded its line of weapons, introducing a new sporty line at a glitzy

event in Moscow. The Russian maker of the AK-47 describes its range of arms as "weapons of peace". But Americans hoping to fire off a brand new AK-47 this Christmas will be disappointed. Because of Russian meddling in Ukraine America has banned the sale of Kalashnikov guns, which sparked frenzied demand for the AK-47 before the ban came into force during the summer.

Skinny profits

Abercrombie & Fitch, a clothing retailer famed for figure-hugging apparel aimed at the lithe elite (its boss once said that some people's bodies simply "can't belong" in its clothes) sharply reduced its annual profit forecast. Competition is stiff in Abercrombie's core teenage market, as rivals, such as H&M and Zara, bring in trendy styles at lower prices.

North Korea was suspected of being behind the recent hacking of **Sony Picture's** computer systems and download onto the internet of its recent and forthcoming films. Sony is releasing a comedy this month about a plot to assassinate the Hermit Kingdom's dictator, Kim Jong Un.

Other economic data and news can be found on pages 102-103



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Sheikhs v shale

The economics of oil have changed. Some businesses will go bust, but the market will be healthier



THE official charter of OPEC states that the group's goal is "the stabilisation of prices in international oil markets". It has not been doing a very good job. In June the price of a barrel of oil, then almost \$115, began to slide; it now stands close to \$70.

This near-40% plunge is thanks partly to the sluggish world economy, which is consuming less oil than markets had anticipated, and partly to OPEC itself, which has produced more than markets expected. But the main culprits are the oilmen of North Dakota and Texas. Over the past four years, as the price hovered around \$110 a barrel, they have set about extracting oil from shale formations previously considered unviable. Their manic drilling—they have completed perhaps 20,000 new wells since 2010, more than ten times Saudi Arabia's tally—has boosted America's oil production by a third, to nearly 9m barrels a day (b/d). That is just 1m b/d short of Saudi Arabia's output. The contest between the shalemens and the sheikhs has tipped the world from a shortage of oil to a surplus.

Fuel injection

Cheaper oil should act like a shot of adrenalin to global growth. A \$40 price cut shifts some \$1.3 trillion from producers to consumers. The typical American motorist, who spent \$3,000 in 2013 at the pumps, might be \$800 a year better off—equivalent to a 2% pay rise. Big importing countries such as the euro area, India, Japan and Turkey are enjoying especially big windfalls. Since this money is likely to be spent rather than stashed in a sovereign-wealth fund, global GDP should rise. The falling oil price will reduce already-low inflation still further, and so may encourage central bankers towards looser monetary policy. The Federal Reserve will put off raising interest rates for longer; the European Central Bank will act more boldly to ward off deflation by buying sovereign bonds.

There will, of course, be losers (see page 81). Oil-producing countries whose budgets depend on high prices are in particular trouble. The rouble tumbled this week as Russia's prospects darkened further. Nigeria has been forced to raise interest rates and devalue the naira. Venezuela looks ever closer to defaulting on its debt. The spectre of defaults and the speed and scale of the price plunge have unnerved financial markets. But the overall economic effect of cheaper oil is clearly positive.

Just how positive will depend on how long the price stays low. That is the subject of a continuing tussle between OPEC and the shale-drillers. Several members of the cartel want it to cut its output, in the hope of pushing the price back up again. But Saudi Arabia, in particular, seems mindful of the experience of the 1970s, when a big leap in the price prompted huge investments in new fields, leading to a decade-long glut. Instead, the Saudis seem to be pushing a different tactic: let the price fall and put high-cost producers out of business. That should soon crimp supply, causing prices to rise.

There are signs that such a shake-out is already under way. The share prices of firms that specialise in shale oil have been

swooning. Many of them are up to their derricks in debt. Even before the oil price started falling, most were investing more in new wells than they were making from their existing ones. With their revenues now dropping fast, they will find themselves overstretched. A rash of bankruptcies is likely. That, in turn, would bespatter shale oil's reputation among investors. Even survivors may find the markets closed for some time, forcing them to rein in their expenditure to match the cash they generate from selling oil. Since shale-oil wells are short-lived (output can fall by 60-70% in the first year), any slowdown in investment will quickly translate into falling production.

This shake-out will be painful. But in the long run the shale industry's future seems assured. Fracking, in which a mixture of water, sand and chemicals is injected into shale formations to release oil, is a relatively young technology, and it is still making big gains in efficiency. IHS, a research firm, reckons the cost of a typical project has fallen from \$70 per barrel produced to \$57 in the past year, as oilmen have learned how to drill wells faster and to extract more oil from each one.

The firms that weather the current storm will have masses more shale to exploit. Drilling is just beginning (and may now be cut back) in the Niobrara formation in Colorado, for example, and the Mississippian Lime along the border between Oklahoma and Kansas. Nor need shale oil be a uniquely American phenomenon: there is similar geology all around the world, from China to the Czech Republic. Although no other country has quite the same combination of eager investors, experienced oilmen and pliable bureaucrats, the riches on offer must eventually induce shale-oil exploration elsewhere.

Most important of all, investments in shale oil come in conveniently small increments. The big conventional oilfields that have not yet been tapped tend to be in inaccessible spots, deep below the ocean, high in the Arctic, or both. America's Exxon Mobil and Russia's Rosneft recently spent two months and \$700m drilling a single well in the Kara Sea, north of Siberia. Although they found oil, developing it will take years and cost billions. By contrast, a shale-oil well can be drilled in as little as a week, at a cost of \$1.5m. The shale firms know where the shale deposits are and it is pretty easy to hire new rigs; the only question is how many wells to drill. The whole business becomes a bit more like manufacturing drinks: whenever the world is thirsty, you crank up the bottling plant.

Sheikh out

So the economics of oil have changed. The market will still be subject to political shocks: war in the Middle East or the overdue implosion of Vladimir Putin's kleptocracy would send the price soaring. But, absent such an event, the oil price should be less vulnerable to shocks or manipulation. Even if the 3m extra b/d that the United States now pumps out is a tiny fraction of the 90m the world consumes, America's shale is a genuine rival to Saudi Arabia as the world's marginal producer. That should reduce the volatility not just of the oil price but also of the world economy. Oil and finance have proved themselves the only two industries able to tip the world into recession. At least one of them should in future be a bit more stable. ■

Nuclear power in China

Make haste slowly

China's rush to build nuclear power plants is dangerous



COAL kills, especially in China. Up to half a million people die prematurely each year as a result of the country's infamously foul air. Coal, from which China gets roughly four-fifths of its electricity, is the main contributor to that deadly pollution. And since the country's power-generation may need to double by 2030 to keep pace with economic growth and more affluent lifestyles, the damage from coal will get worse before it gets better. Given that grim picture, it is understandable that the government wants to diversify its energy sources.

Nuclear power is central to this ambition. Even as doubts about it grow in the rest of the world, China has made its expansion a priority. With over two dozen reactors under construction, it wants to more than triple nuclear capacity by 2020. On December 10th China General Nuclear Power (CGN), the country's biggest builder and operator of nuclear plants, plans to float shares on the Hong Kong stock exchange (see page 75). Since the government has no need for outside investors to fund its nuclear ambitions, CGN's partial flotation is a statement of the industry's political profile.

For most countries nuclear power is a poor option. Big reactors invariably cost more and take longer to build than predicted. As alternative sources of energy have proliferated, the economics of nuclear energy have worsened. The other worry is safety. Just as the memory of the Fukushima disaster in Japan was starting to fade, Europe's biggest nuclear reactor, in Ukraine, was shut down this week. Such worries increase the risk of politicians cancelling projects, which also raises the costs.

China, however, faces none of these constraints. The government is willing to pay for countless loss-making infrastructure projects, most of its citizens worry more about air pollu-

tion than nuclear safety and there is no political opposition waiting to sweep to power and mothball the reactors. Nonetheless, the headlong rush to nuclear power is more dangerous and less necessary than China's government admits.

One of the main lessons of Fukushima was that politicised, opaque regulation is dangerous. China's rule-setting apparatus is also unaccountable and murky, and ambitious targets for a risky technology should ring warning bells. Earlier this year, a French nuclear-safety regulator, familiar with the Chinese situation, declared his counterparts to be "overwhelmed". The regime has form in neglecting safety in the pursuit of technohubris: pressure to have the world's fastest trains lay behind the regulatory failures that caused a catastrophic train crash near Wenzhou in 2011.

Beware bureaucrats setting bold targets

China's approach to building capacity has added to the risk of an accident. Rather than picking a single proven design for new reactors from an experienced vendor and replicating it widely, the government has decided to "indigenise" Western designs. The advantage of this approach is that China can then patent its innovations and make money out of selling them to the world; the downside is that there are now several competing designs promoted by rival state-owned enterprises, none of which is well tested.

China should slow its nuclear ambitions to a pace its regulators can keep up with, and build its reactors using the best existing technology—which happens to be Western. That need not condemn it to more sooty, coal-fired years. The cost of renewable energy is dropping quickly and its efficiency is rising sharply. Last year, over half of all new power-generation capacity installed in China was hydro, wind or solar. If China wants to accelerate its move away from coal, ramping up those alternatives yet more would be a lot safer. ■

Japan's election

Abe's last chance

Japan desperately needs economic reform; Shinzo Abe still offers the best chance of that



TWO years ago Shinzo Abe ran for office vowing to end Japan's long economic malaise by banishing deflation and smashing the old habits that impeded growth. He promised to make a country suffering a collapse in confidence once again stand tall. Mr Abe won the election in a landslide, yet barely two years later he has called another.

One reason for this is painfully obvious: Mr Abe has failed to deliver on those promises. Japan is once more flirting with recession and deflation. Households feel no better off. Prom-

ised structural reforms have not happened. "Abenomics", the prime minister's slickly marketed programme, is looking to many Japanese like a prescription that is benefiting only the rich and big business. Mr Abe's decision to hold a fresh election on December 14th is in part a cynical move to consolidate his power before his popularity falls further.

In political terms that gamble seems likely to pay off. Given a weak opposition, it would be a shock if his Liberal Democratic Party and its junior partner, Komeito, did not win again. But does Mr Abe actually deserve a second term? Our answer is yes—but only if he does what, in an interview with this newspaper (see page 41), he says he will by finally embarking on the structural reforms that his country badly needs. ►►



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▶ Mr Abe's record is mixed. In foreign policy, he has had to cope with a resurgent China, which has been asserting territorial claims (see *Banyan*). But his own revisionist jingoism has often looked dangerous: his visit to the Yasukuni shrine was a needless insult to all those Asian countries whose people were slaughtered by the war criminals that are honoured there. In Mr Abe's Japan, newspapers are once again using the term "comfort women" for the wartime sex slaves its soldiers degraded (see page 42), hardly tactful with the rest of Asia due to celebrate the end of the second world war next year.

But economics has been at the core of Mr Abe's premiership. The start of Abenomics was impressive. Early last year the Bank of Japan launched a radical programme of quantitative easing—the first of Mr Abe's promised "three arrows". Along with the second arrow, a big dollop of public spending, this was meant to boost consumer confidence, lift financial markets and so overcome the drag caused by a long-planned rise in the consumption tax from 5% to 8% in April this year. This strategy did not work, largely because the tax rise did far more damage than anyone expected, with GDP falling at an annual rate of 7.1% in the second quarter, and a further 1.6% in the third. Core inflation in the year to October fell to 0.9%.

The Bank of Japan and Mr Abe have rightly responded to the threat of deflation by expanding quantitative easing and postponing the next rise in the consumption tax. But, given that public debt is already over 240% of GDP, Mr Abe needs to find other ways to spur the economy. Hence the emphasis on

his largely unused third arrow: structural reforms to boost productivity and thus the economy's capacity for growth.

In his first term Mr Abe forced Japan's conservative business establishment to accept some useful changes in corporate governance and dared to say that women could be useful in the workplace. But he failed to confront the farmers, energy producers and other vested interests that gum up Japan's economy. Now he promises vigorous action after the election. He says he will open up agriculture, overhaul the electricity market and liberalise the overly rigid labour market. He insists that a long-delayed trade deal with America over the Trans-Pacific Partnership (TPP) is imminent. That means taking on the farmers who have blocked the deal.

There is no alternative

Fulfilling these promises would tell the world that Japan was again open for business. But will Mr Abe do it? Cynics point out that he has expressed his enthusiasm for the TPP rather less enthusiastically to domestic audiences than to foreign ones. But he did begin this term in office with considerable flair—far more than the cynics expected. Whatever his inconsistencies, Mr Abe does seem determined to make Japan great, which he cannot do without reviving the economy. Above all, he is running out of time. Unless he pushes ahead with reforms, both Japanese consumers and foreign investors will lose faith in his country's ability to recover, and disaster will follow. In *The Economist's* view he is still Japan's best bet. ■

The transformation of cities

A suburban world

The emerging world is becoming suburban. Its leaders should welcome that, but avoid the West's mistakes



IN THE West, suburbs could hardly be less fashionable. Singers and film-makers lampoon them as the haunts of bored teenagers and desperate housewives. Ferguson, Missouri, torched by its residents following the police shooting of an unarmed black teenager, epitomises the failure of many American suburbs. Mayors like boasting about their downtown trams or metrosexual loft dwellers not their suburbs.

But the planet as a whole is fast becoming suburban. In the emerging world almost every metropolis is growing in size faster than in population. Having bought their Gucci handbags and Volkswagens, the new Asian middle class is buying living space, resulting in colossal sprawl. Many of the new suburbs are high-rise, though still car-oriented; others are straight clones of American suburbs (take a look at Orange County, outside Beijing). What should governments do about it?

The space race

Until a decade or two ago, the centres of many Western cities were emptying while their edges were spreading. This was not for the reasons normally cited. Neither the car nor the motorway caused suburban sprawl, although they sped it up: cities were spreading before either came along. Nor was the flight to the suburbs caused by racism. Whites fled inner-city neigh-

bourhoods that were becoming black, but they also fled ones that were not. Planning and zoning rules encouraged sprawl, as did tax breaks for home ownership—but cities spread regardless of these. The real cause was mass affluence. As people grew richer, they demanded more privacy and space. Only a few could afford that in city centres; the rest moved out.

The same process is now occurring in the developing world, but much more quickly. The population density of metropolitan Beijing has collapsed since 1970, falling from 425 people per hectare to 65 (see our essay this week). Indian cities are following; Brazil's are ahead. And suburbanisation has a long way to run. Beijing is now about as crowded as metropolitan Chicago was at its most closely packed, in the 1920s. Since then Chicago's density has fallen by almost three-quarters.

This is welcome. Romantic notions of sociable, high-density living—notions pushed, for the most part, by people who themselves occupy rather spacious residences—ignore the squalor and lack of privacy to be found in Kinshasa, Mumbai or the other crowded cities of the poor world. Many of them are far too dense for dignified living, and need to spread out.

The Western suburbs to which so many aspire are healthier than their detractors say. The modern Stepfords are no longer white monocultures, but that is progress. For every Ferguson there are many American suburbs that have quietly become black, Hispanic or Asian, or a blend of everyone. Picaresque accounts of decay overlook the fact that America's suburbs are half as criminal and a little more than half as poor as central ▶▶

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cities. Even as urban centres revive, more Americans move from city centre to suburb than go the other way.

But the West has also made mistakes, from which the rest of the world can learn. The first lesson is that suburban sprawl imposes costs on everyone. Suburbanites tend to use more roads and consume more carbon than urbanites (though perhaps not as much as distant commuters forced out by green belts). But this damage can be alleviated by a carbon tax, by toll roads and by charging for parking. Many cities in the emerging world have followed the barmy American practice of requiring property developers to provide a certain number of parking spaces for every building—something that makes commuting by car much more attractive than it would be otherwise. Scrapping them would give public transport a chance.

The second is that it is foolish to try to stop the spread of suburbs. Green belts, the most effective method for doing this, push up property prices and encourage long-distance commuting. The cost of housing in London, already astronomical, went up by 19% in the past year, reflecting not just the city's

strong economy but also the impossibility of building on its edges. The insistence on big minimum lot sizes in some American suburbs and rural areas has much the same effect. Cities that try to prevent growth through green belts often end up weakening themselves, as Seoul has done.

A wiser policy would be to plan for huge expansion. Acquire strips of land for roads and railways, and chunks for parks, before the city sprawls into them. New York's 19th-century governors decided where Central Park was going to go long before the city reached it. New York went on to develop in a way that they could not have imagined, but the park is still there. This is not the dirigisme of the new-town planner—that confident soul who believes he knows where people will want to live and work, and how they will get from one to the other. It is the realism needed to manage the inevitable. A model of living that has broadly worked well in the West is spreading, adapting to local conditions as it goes. We should all look forward to the time when Chinese and Indian teenagers write sulky songs about the appalling dullness of suburbia. ■

Regulating robotic aircraft

Free the drones

Drones have immense commercial potential—so long as regulators don't try to tether them to the ground



ONE of this year's top-selling Christmas presents is a drone. For \$50 you can buy a tiny quadcopter with a video camera, perfect for snapping a bird's-eye view of your garden; for \$700, one equipped with a gyroscopically stabilised camera

which, when paired with a wireless tracking device on your wrist, will film you while you ski, cycle or kite-surf. More significantly still, as our Technology Quarterly outlines this week, drones could revolutionise all sorts of businesses.

Initially developed for military use, drones are taking off in civilian life largely thanks to the falling costs of commodity electronics. A smartphone contains a raft of devices that can be deployed in drones, including gyroscopes, accelerometers, wireless transmitters, signal processors and GPS units.

One immediate commercial use is surveying land cheaply and effectively. A drone can photograph a road to a resolution of 2cm, compared with the 30cm that a satellite offers—and it can do so at a third of the cost. Already farmers are using them to monitor crop growth, which in turn enables modern farm machinery to deliver exactly the right amount and type of fertiliser. In France, where the technology is widely used, farmers say drones boost revenues by €50 (\$62) or so per hectare. Drones also improve safety: they can be used to do jobs, such as inspecting power lines, that currently require dangling a man from a helicopter. And they can deliver goods faster: DHL, a logistics firm, already uses a “parcelcopter” to deliver medicine to Juist, a small island off the coast of Germany.

But their potential depends on regulation. Since they can be dangerous—there are increasing numbers of reports from nervous airline pilots of drones flying near them—governments need to set rules for their use. And treatment of the commercial drones varies between countries.

America's Federal Aviation Authority (FAA) bans almost all commercial drone use. That will soon change, as Congress has ordered it to come up with rules for commercial drone flights by September 30th 2015. But draft proposals due in the next few weeks are expected to show that the FAA continues to take a restrictive view, requiring drone operators to have experience flying manned aircraft and to keep drones within sight at all times. The drone industry suspects that this is regulatory capture—that the FAA is acting as a lobby for pilots.

The FAA's attitude is damaging America's drone business. Firms are shifting fledgling drone operations outside the country. Amazon has tested a drone-delivery service in Canada while Google has experimented with robotic aircraft in Australia. Overly protective regulation also leads to less safe skies. The ban is widely ignored and the new rules will probably be too. Unlicensed flights will be uncharted, the craft unidentified and their operators uninsured.

Horses for courses

The right way to balance safety and innovation is to create a set of rules for commercial drones that depend on their size, use and so on. That is what happens in some countries: Canada, for instance, exempts small drones from regulatory oversight. The rules should also vary according to location, since surveying the outside of a building in a city is more hazardous than flying over a field. Japan recognises this. And requiring drone pilots to have experience flying manned aircraft is daft. Far better to say, as Britain and Australia do, that drone pilots need to be certified as competent to fly a drone.

Like any disruptive technology, commercial drones will hurt existing businesses. Some pilots will lose their jobs as more farmers and logistics firms use drones instead of hiring a helicopter or aircraft. The incumbents' opposition to the drone industry is understandable. The FAA's is not. It should take a more objective view, and free commercial drones. ■

Arming the police

SIR – Calling for military-grade weapons to be withdrawn from police forces (“The fury of Ferguson”, November 29th) ignores the fact that many criminals use such weapons. The police must be able to defend themselves and the public with equivalent force. The knee-jerk call for “proper” gun-control measures misses the real problem: criminals hold guns illegally that are not obtained through the channels to which gun laws apply.

In many states it is already illegal to carry a concealed weapon and to own rapid-fire automatic rifles. Yet many suspects who are arrested for such violations are quickly back on the streets.

JERRY HARTKE
Lancaster, Massachusetts

SIR – More than 52,000 police officers were assaulted in America in 2012. That’s 142 assaults on the police each day. And people wonder why they come across as jaded and gruff.

BRIAN DUGAN
Fairfax, Virginia

SIR – The call by Michael Brown’s stepfather to “burn this bitch down” did not sound like a “call for calm” to me.

FRANCISCO SILVA
New York

Women’s seats on the board

SIR – You reckoned that companies “fled” the Norwegian stockmarket when quotas for female board members were phased in (Schumpeter, November 15th). Actually, the flow of companies went in the opposite direction. In modern times the Oslo stock exchange has never seen such strong IPO activity. The number of companies with listed shares increased from 176 in 2003 to 257 in 2008. But rather than having anything to do with the introduction of female quotas, this is mostly explained by the growth of the energy industry, for which the Oslo Bors is a leading exchange.

GEIR HARALD AASE
Communications manager
Oslo Bors

SIR – Schumpeter highlighted a common problem with diversity policies. There are stark differences in motivational factors that drive men and women to be successful at the top. Our research has revealed that males are motivated by power and the fear of failure, whereas women are driven by a constructive working atmosphere and recognition. With males largely dominating senior positions, it is likely that an environment fuelled by fear of failing and losing face is turning women off.

JEAN MARTIN
Executive director
CEB
Arlington, Virginia

Over a barrel



SIR – There is a historical precedent linking Russia’s weakened state to falling oil prices (“Russia’s wounded economy”, November 22nd). As Thomas Friedman pointed out in his book “Hot, Flat and Crowded”, the Soviet Union’s demise was brought about not so much by Ronald Reagan’s efforts in the cold war, but by Sheikh Yamani, Saudi Arabia’s former oil minister, when he announced the quadrupling of oil production in September 1985. The price of oil collapsed, and so did the Soviet Union five years later.

MIKE COCKING
Cedarburg, Wisconsin

Demand driven

SIR – The fanciful theories you cited about the effects of the changing structure of age on economic growth (Free exchange, November 22nd) all missed a central insight: that growth is driven by disposable income. Henry Ford wanted to ensure that every worker in his

factories could afford to buy a Model-T. In Britain we need to provide working people with a wage that enables them to spend with confidence. We are in denial over this. If people can’t afford to spend because of severe income compression then growth will stagnate. Stimulating demand by improving the capacity of working people to consume would take us forward in addressing the chronic imbalances in the British economy.

RICHARD TUDWAY
London

Pacific time

SIR – Your special report on the Pacific (November 15th) had a section on maritime disputes which mentioned that the American Senate has not ratified the UN Convention on the Law of the Sea (UNCLOS). This important point deserves some additional emphasis. America’s criticism of China’s policy on the seas might have more traction if, like China and virtually every other maritime nation, it was signed up to this vital convention. America’s reluctance to ratify UNCLOS has wider implications for the reform of governing the oceans with respect to matters such as environmental protection.

SIMON BENNETT
Director
Policy and external relations
International Chamber of Shipping
London

SIR – It is no surprise that the Yasukuni Shrine in Tokyo maintains that “an American naval blockade against Japanese oil imports in 1941 triggered the Pacific war”. There was no “blockade”, as the American navy lacked the power to enforce one, given the strength of the Japanese Imperial fleet at the time. America did place an embargo on its oil exports to Japan in August 1941. This economic sanction (rather than a military action) was in response to Japan’s occupation of French Indochina shortly before.

ROBERT LETHGO
Munich

From when disco was king

SIR – It would indeed be nice if we could impose term limits on African presidents (“Not so pretty now”, November 8th). But your list of Africa’s Big Men hanging on to power left out Teodoro Obiang Nguema of Equatorial Guinea, the longest-serving head of state in Africa. In office since 1979, he plans to run again despite an abysmal human-rights record. Mr Obiang is 72 years old, whereas the average life expectancy in my country is 53.

Perhaps your omission was due to Equatorial Guinea’s control of the media. This oil-rich country is one of the few in the world where it is impossible to buy a copy of *The Economist*.

TUTU ALICANTE
Executive director
EG Justice
Tampa, Florida

Golden oldies



SIR – The article about pensioners taking to drink and drugs brought to mind part of a poem (“Sex and drugs and getting old”, November 22nd).

I was a good boy with a life of
peace and quiet
I shall have an old age full of
rum and riot
I was a young man wed to
work and study
I shall be an old man ribald,
coarse and bloody.

NORMAN MOSS
London ■

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Regional director, Europe

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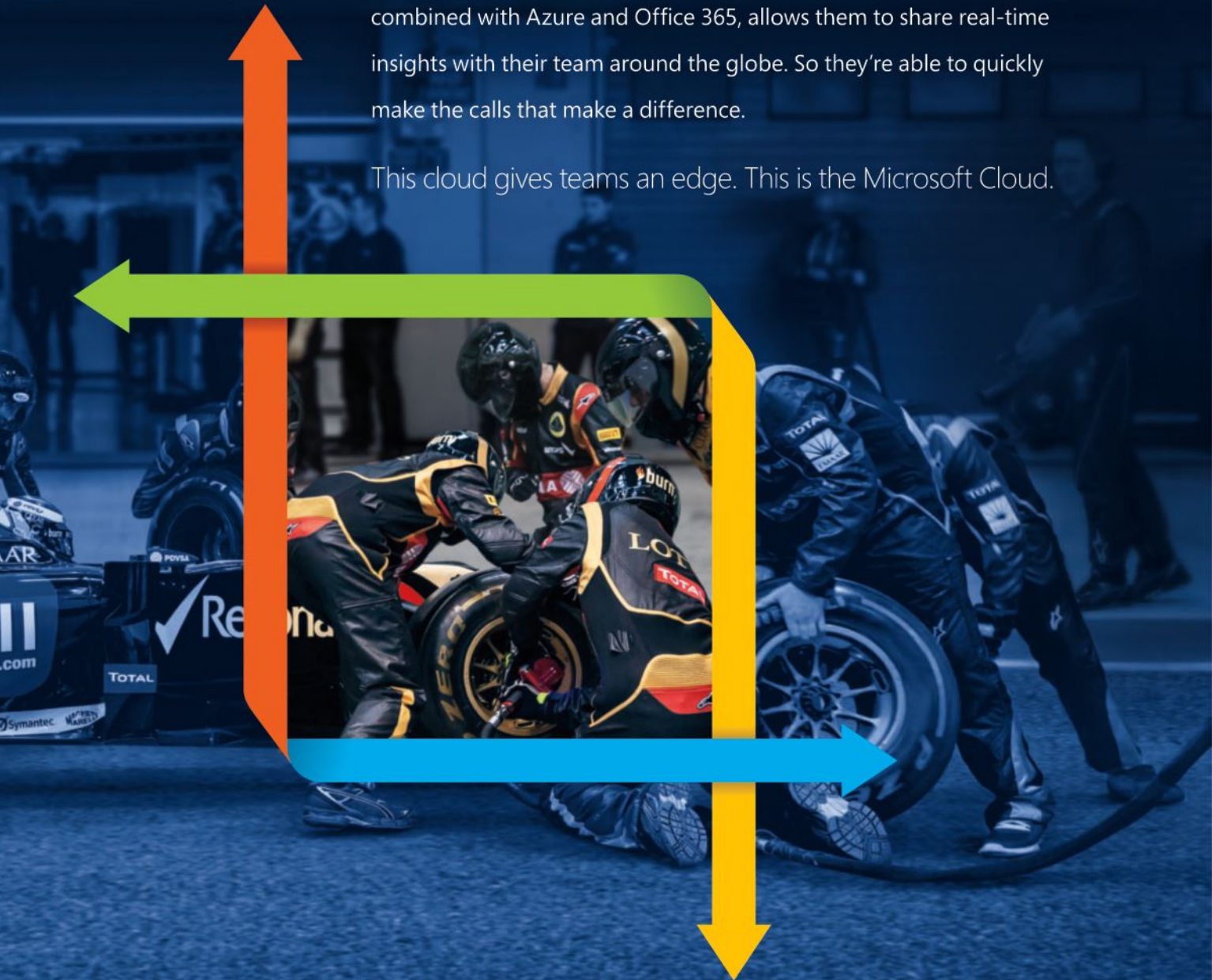


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Veterans

What next?

WASHINGTON, DC

Nearly half of new federal employees are military veterans

WHAT do American troops, who have spent much of the past 15 years in desert camouflage, do when they come home? Compared with veterans of previous wars, they are more likely to work for the federal government, where almost half of all new hires are now veterans. They are more likely to be disabled. And they are less likely to be in the labour force. These last two trends mean that the financial cost of the Afghanistan and Iraq wars will remain high long after the final bullets have been fired.

Around 200,000 people leave the military each year. Most go through a Pentagon programme designed to ease the transition to civilian life. This often points in one direction: towards government employment. Veterans have been more likely to work for the government than workers as a whole since the introduction, between the two world wars, of laws ordering the bureaucracies to favour them when hiring. There was a bump in the number of vets in the civil service after the second world war and again after Vietnam, but nothing on the scale of the increase since 2009 (see chart) when Barack Obama ordered the government to hire even more of them. Americans revere veterans almost as much as they distrust federal bureaucrats, yet increasingly they are the same people.

No one would be surprised to hear that a hefty 46.5% of the civilian employees of the Defence Department are veterans. But it does not stop there. Some 36% of staff at

the Department of Transport, 24% at Justice and 22% at Energy are accustomed to calling their managers "sir". Under veterans' preference rules, soldiers who were severely wounded or received a Purple Heart gain a ten-point head start over everyone else when being considered for employment. For some jobs, civil servants are obliged to hire veterans if competent ones can be found. In cases where a soldier has been killed or severely wounded, his or her spouse can be appointed to a federal job without any competition.

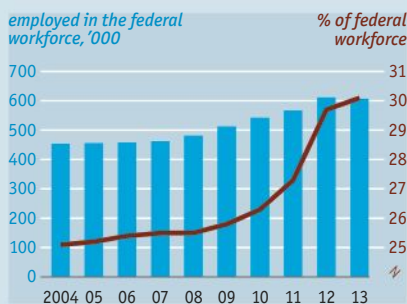
Though there are reasons to worry about the effects of hiring people on criteria other than being the best person for the job, an infusion of veterans can be beneficial. "These folks are generally used to get-

ting things done, rather than coming up with 50 reasons why something is impossible," says Elaine Kamarck of the Brookings Institution, a think-tank. Besides, the federal government's hiring practices have bigger problems than a pro-veteran bias, argues Max Stier of the Partnership for Public Service, another think-tank. Mr Stier's outfit examined hiring at one government department and discovered a 105-step process involving 45 people, none of whom had a clear idea of what the people leading the department wanted from new employees. "The likelihood of getting the right person for the job was next to none," says Mr Stier. "It was essentially random."

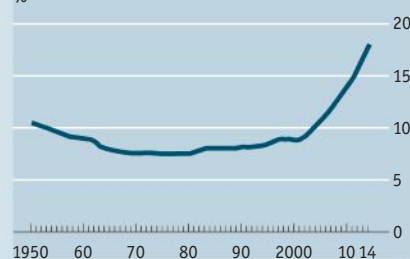
Traditionally, military veterans have done well in the labour market, not least because the kind of people the military hires in the first place tend to be in better physical and mental health than the population as a whole. But a forthcoming paper by Courtney Coile of Wellesley College, Mark Duggan and Audrey Guo (both of Stanford) finds that this is no longer true. From 1980-2000 veterans were more likely than other workers to be in or looking for work. That changed around the turn of the ►►

Rise of the vetocracy

Military veterans:



receiving disability compensation benefits %



Sources: Office of Personnel Management; "Veterans' Labor Force Participation", forthcoming paper by C. Coile, M. Duggan & A. Guo

century and the gap has widened since: young veterans are now more likely to be unemployed than other workers.

As Mr Duggan points out, this change coincided with another: the rise in the number of veterans receiving disability payments. After the second world war about 15% of veterans claimed some disability payment, a rate that increased to about 25% after Vietnam. For the current cohort leaving the military, the figure is closer to half. One often cited reason for this is that improvements in battlefield medicine and body armour mean that soldiers survive blasts that would once have been fatal. Instead of dying, many return home with traumatic brain injuries.

Yet improved body armour does not get close to accounting for the increase in disability payments, says Lieutenant Colonel Daniel Gade of West Point (Mr Gade speaks from experience: his right leg was blown off in Iraq in January 2005). Disability payments are awarded according to a sliding scale of severity, expressed as a percentage. A case of post-traumatic stress disorder rates as 60-70% disabled. Mr Gade's amputation would qualify him as 100% disabled if he left the army. One of the fastest growing subsets of disabled veterans is

a group judged so disabled that they are eligible for an "unemployability" payment of \$3,100 a month for someone with a spouse and one child.

While most disability payments are made in addition to anything veterans earn, this is not the case for these more generous benefits. As soon as a veteran earns over \$1,000 a month, \$2,100 in unemployability payments are withdrawn—"a monster disincentive to work," says Mr Gade.

The lingering cost of war

Attempts to reform veterans' benefits are almost as old as the benefits themselves. In 1955 the Bradley Commission judged that payments to veterans were unaffordable and poorly designed. Yet where veterans are concerned, congressmen worry only about whether their votes seem generous enough. Spending on disability benefits for veterans has almost tripled since 2000, to \$54 billion a year. Left unchecked this will increase as today's veterans age, further shifting the Pentagon's budget away from fighting and towards providing care for ex-employees. Reversing this will require politicians to take on disabled veterans. Most would sooner burn Old Glory on live television. ■

America's next defence secretary

Fit for purpose

Ashton Carter is well-qualified to lead the Pentagon, if he is allowed to

ASHTON CARTER once urged the preemptive bombing of North Korea's nuclear facilities. (It was in an article he wrote in 2006, while out of office.) He also wanted American troops to stay on in Iraq after 2011. Yet Barack Obama, who is hardly known for his hawkishness, appears poised to name him as defence secretary.

He would replace Chuck Hagel, a decorated veteran with a profound aversion to the ill-considered use of force. Mr Hagel, a Republican, was inarticulate, flummoxed by detail and floundered in the job, particularly when faced with the complex challenge of taking on the Islamic State in Iraq and Syria. Relentless micromanagement from the White House made things worse.

Insiders praise Mr Carter's competence and experience. A physicist by training, he was deputy defence secretary under Leon Panetta, responsible for controlling a \$600 billion annual budget. Such was his indispensability that Mr Obama asked him to continue in the job for a year after Mr Panetta left in 2013, to help Mr Hagel—an uncomfortable period for both men.

Before that, Mr Carter was the head of

acquisitions, restructuring the bloated Joint Strike Fighter (JSF) programme and cancelling costly under-performing or outdated programmes. Soldiers in the field called him "the Deliverer", for his ability to cut through the Pentagon's copious red tape and get urgently-needed kit to the front line, such as MRAPs (mine-resistant ambush-protected vehicles) to shield



More hawkish than Hagel

troops from roadside bombs.

In Bill Clinton's first administration, Mr Carter was in charge of America's vast nuclear arsenal and led the effort to dismantle and remove more than 8,000 nuclear weapons from states that had been part of the old Soviet Union. He also helped build security relationships with countries in eastern Europe that paved the way for them to join NATO.

Although some complain that Mr Carter's intellectual self-confidence and command of the most esoteric technical details can make him appear arrogant or aloof, his confirmation hearings on Capitol Hill should be much easier than the grilling Mr Hagel received. Both Mac Thornberry and John McCain, the Republicans who are about to take the helms of the House and Senate Armed Services Committees, are likely to see Mr Carter as an ally in reforming the Pentagon's sclerotic procurement practices. Mr McCain, an arch-foe of wasteful defence spending, often clashed with Mr Carter over the JSF; yet he developed a grudging respect for him. Kori Schake, a former Bush administration security official now at the Hoover Institution, a think-tank, describes Mr Carter as "able, intelligent, effective and energetic".

Mr Carter will need all those qualities and more if he is to make his mark over the next two years. He will want to forge a deal with Congress to bring more stability to the defence budget and undo some of the cuts mandated under sequestration. Since the world looks scarier now than it did a year or two ago, the military budget ought perhaps to grow a bit. However, Todd Harrison of the Centre for Strategic and Budgetary Assessments in Washington reckons that the political compromises needed for a long-term fix are unlikely.

Mr Carter will also attempt to persuade Mr Obama and his ever-meddling team of advisers that some new thinking is needed to deal with the situation in Iraq and Syria. In particular, Mr Obama's habit of deliberately constraining military options (for example, by ruling out the use of combat troops on the ground or, as in Afghanistan, setting timetables unrelated to conditions) makes the task of any defence secretary immeasurably harder.

For all his knowledge and experience of strategic issues, however, Mr Carter may still find himself excluded from real influence. Michael O'Hanlon of the Brookings Institution, a think-tank, says that when the decision was made to get rid of Mr Hagel, Mr Obama and his team on the National Security Council wanted someone personally close to the president who had worked his or her way up through their own ranks. To get a hearing from this inner circle, says Mr O'Hanlon, Mr Carter will have to decide "how much china he's prepared to break and how many political risks he's prepared to take". ■

The budget

Deficit? What deficit?

WASHINGTON, DC

Republicans and Democrats are quarrelling about the budget again, but not about the deficit

IMMEDIATELY after last month's congressional elections, leaders of both parties swore to halt the partisan combat that had paralysed budget policy for years. The government would not shut down or default on its debt, pledged Mitch McConnell, the Republican who will become Senate leader in January.

A shutdown seems unlikely; a default even more so. But the hoped-for comity has yet to materialise. Under current arrangements the government's funding runs out on December 11th and bipartisan efforts to extend it until next September have been waylaid by Republicans seeking to stop Barack Obama's order suspending deportations of millions of illegal immigrants. A separate deal to make permanent and expand a host of business tax breaks all-but collapsed when Mr Obama signalled he would veto it. As *The Economist* went to press, the fate of both bills was in

the balance. On December 3rd the House of Representatives passed a scaled-back one-year retroactive extension of the tax breaks; it is likely to pass the Senate.

Little of the partisan sniping has anything to do with the short-term deficit. The numbers explain why. The deficit peaked at \$1.4 trillion in 2009—a massive 9.8% of GDP. By the fiscal year that ended in September, the gap had narrowed to 2.8% of GDP, not far above the 2.5% average from 1980 to 2008. As the deficit has dropped, so has its political potency. In early 2013 a quarter of Americans thought the deficit was the country's most pressing problem. Now, barely a tenth do.

The repercussions have been perverse. In 2011 Congress and Mr Obama agreed to cap federal discretionary spending (which must be authorised each year by Congress) when the economy was least able to withstand such austerity. The real threat to

America's finances is the long-term cost of entitlements such as Social Security and Medicare (pensions and health care for the old), which went largely unaddressed.

The deficit has now all but dropped off the political agenda. For example, Republicans used to demand curbs to entitlements. But during the election, many switched places and attacked Democrats for wanting to raise the retirement age, a sensible way to make Social Security more solvent. The same insouciance shows up on taxes. Some 55 tax breaks expired last year and another six this year, ranging from credits for research and development, to breaks for racehorses and NASCAR race tracks. Republican and Democratic negotiators originally planned to expand and make permanent many of them, at a cost of \$409 billion over 10 years, according to the Centre on Budget and Policy Priorities, a liberal think-tank. Mr Obama killed the deal not because it would increase the deficit but because it omitted his own favoured giveaways: the permanent expansion of two tax credits for the working poor now scheduled to expire in 2017.

For their part, Republicans reportedly wanted to leave out Mr Obama's tax credits not because of their cost but for fear that illegal immigrants would apply for them. It now seems that immigration, rather than ▶▶

Seven years since the recession began: how America is faring

GDP, % change on previous quarter
At an annual rate



Although the economy has grown steadily, at 2.3% a year, this has disappointed forecasters and led many to downgrade America's long-term potential growth rate

Median household income
\$'000, 2013 prices



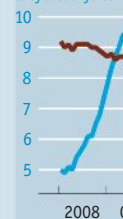
The typical family has yet to make up the ground lost during the recession and its aftermath; the wealthy and well educated have done much better

Federal budget deficit†
\$trn / As % of GDP



After ballooning because of recession and stimulus, the budget deficit has returned to normal. But as Americans age and demand more pills and pensions, it will rise again

Unemployment
% of labour force

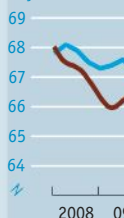


After declining for five years the unemployment rate is almost back to normal, thanks to solid job growth and the fact that millions have retired or given up looking for work. The labour-force participation rate is the lowest it has been since the 1970s

Labour-force participation
%



Homeownership
% of total



Low interest rates and shrinking inventory have helped home prices recover since the crash. But the proportion of Americans who own homes has fallen, thanks to high unemployment and tougher mortgage lending standards

20-city home-price index
January 2000=100

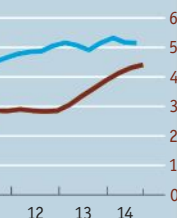


Public debt
As % of GDP

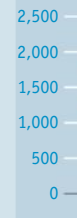


The national debt shot up in the aftermath of the recession, but stabilised as deficits shrank. A big chunk of that debt is now in the hands of the Fed, which bought bonds with newly created money to reduce long-term interest rates and spur growth

Federal Reserve's assets
\$trn



S&P 500
1941-43=10



The stockmarket has set new highs thanks to strong profits and the Fed's bond-buying, which has pushed investors into other, riskier assets. Bond yields have been held down by low inflation worldwide, weak investment and the hunger for safe assets

Ten-year government-bond yields
%



Sources: Bloomberg; Thomson Reuters; Federal Reserve; Office of Management and Budget; Bureau of Labour Statistics; US Census Bureau; S&P/Case-Shiller; Congressional Budget Office; US Treasury Department; Bureau of Economic Analysis; Sentier Research

*As of July

†Fiscal years ending September 30th

▶ the deficit, is holding up funding the government. Republican leaders have proposed to pay the bills of the Department of Homeland Security, which enforces immigration rules, only until the end of March, while funding the rest of the government through to September, when the fiscal year ends. Conservatives object even to that. Mick Mulvaney, a North Carolina representative, calls it “capitulation”. But he does not want to shut the government down. Instead he is pressing to fund it for just a month or two at a time, so a Republican-controlled Senate can address the issue next year. Maya MacGuineas of the Committee for a Responsible Federal Bud-

get, a watchdog, thinks this bodes ill for future decisions on taxes and spending. By March Congress must decide whether to override a scheduled cut to doctors’ Medicare fees; later it must decide how to finance a looming shortfall in the Highway Trust Fund. Austerity exhaustion in both parties means they may simply choose to borrow the money.

Another sign of the times is the debate within the Republican Party over who should run the Congressional Budget Office. The CBO’s non-partisan analysis can make or break proposed laws. Though the current director, Doug Elmendorf, was appointed by Democratic leaders of the Sen-

ate and House, he has often embarrassed Mr Obama and delighted Republicans, for example by noting how Obamacare and a higher minimum wage could discourage work and hiring. Several Republican economists have called for his reappointment. But conservative Republicans want someone even more sympathetic to their priorities, for example who will use so-called “dynamic scoring” to show that tax cuts can help pay for themselves by encouraging more work and investment. Dynamic scoring is fine in theory. The problem arises if a CBO director is so wedded to supply-side theories that he or she downplays how tax cuts can widen the deficit. ■

Rehabilitating young offenders

Pups and perps

LOS ANGELES

What has four legs, a wet nose and helps young thugs grow up?

WHEN Jordan entered juvenile detention shortly after his 17th birthday, following a conviction for assault and robbery, all he could think about was getting out. The rowdy teenager from Anaheim, California, struggled to control his temper. But when he began working with Lulu, a poodle mix, he got a new leash on life. “I was too busy taking care of the dog to get into fights,” he says.

Jordan was taking part in “Pups and Wards”, a programme that pairs shelter dogs with young inmates. The perps train the pups and, with luck, learn something about personal responsibility. Other programmes allow prisoners to train dogs to be adopted by people with disabilities, such as traumatised veterans. Such training often requires full-time care—but prisoners have plenty of time on their hands.

Researchers estimate that there are more than 150 similar programmes at American prisons and detention centres, and that they are growing in popularity. Several recent studies show that pets reduce stress hormones in people and cause the body to produce more endorphins, which inhibit pain and may produce feelings of euphoria.

“All the research about the human-animal bond has buoyed these programmes,” says Gennifer Furst, a professor of criminal justice. “We have discovered that prisoners often identify with rescue dogs—they have both experienced trauma—and they are eager to become their protectors.” Crystal Wood, an officer at a maximum-security prison in Lancaster, California, says that several inmates on her yard—who are in prison for life—weep after interacting with dogs. “Many of these guys haven’t seen an animal in decades. It’s been striking to see how

much working with a dog has reduced their anxiety levels.”

Three-quarters of American prisoners released in 2005 were arrested for a new crime within five years, estimates the Bureau of Justice Statistics. No quantitative studies exist to show whether working with animals helps reduce recidivism, but experts find ample anecdotal evidence that it does. “It gives inmates a sense of responsibility and helps prepare them for a job, once they get out,” says Joan Petersilia of Stanford Law School. “But it also gives something back to the community.”

Since his release, Jordan has avoided being locked up again. He lives with his girlfriend, has a steady job and studies business at a community college. He has his own dog now, a Shih Tzu Pekingese mix. An inspiring tail, indeed.



Sex crimes on campus

Professors as judges

LOS ANGELES

The folly of letting amateurs handle serious crimes

THE uproar about sexual assaults on American college campuses is growing louder. Barack Obama has called them “an affront to our basic humanity”. Several universities—including Johns Hopkins, San Diego State, Emory, MIT, Clemson and the University of Virginia—have shut down or suspended parties at their fraternities in recent months. This week Wesleyan University in Connecticut banned a fraternity from holding social events for a year following two allegations of assaults at booze-fuelled revels. Meanwhile, 90 schools in 35 states are under investigation by the federal Department of Education for mishandling cases of sexual violence.

Rape and sexual assault in America have declined sharply since the mid-1990s, to 11 per 1,000 women per year (see chart on next page). And students are no more likely to be assaulted than non-students of the same age, according to the Bureau of Justice Statistics (though its numbers are somewhat out of date). Yet activists insist that American campuses—and especially fraternities—nurture a “rape culture”.

They often cite an estimate that one woman in five will be sexually assaulted during her time in college, which comes from a report prepared for the Justice Department in 2007. Sceptics doubt this estimate, noting that it was based on a small sample (an online survey of two universities) and used a broad definition of sexual assault, which included everything from rape to any kind of “unwanted sexual contact”, as well as any encounter where one party was too intoxicated by alcohol or drugs to give informed consent.

Reports of horrific individual cases have brought extra attention to the issue. Rolling Stone recently published an ac- ▶▶



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▶ count of an alleged gang-rape at the University of Virginia, where a student says she was attacked by seven men while lying on shards of a broken glass-topped table. The magazine appears not to have interviewed the (un-named) alleged perpetrators, so it is unclear how they respond to the charges.

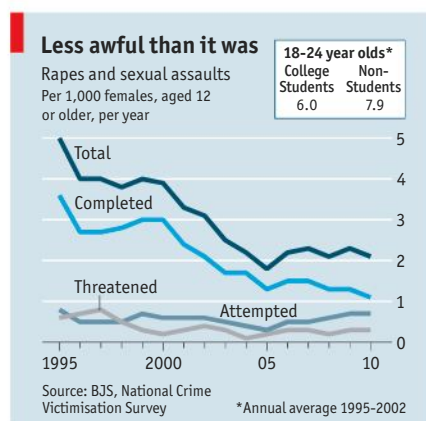
In 2011 the Department of Education sent colleges a letter warning that if they did not take steps to curtail sexual violence, they could be in violation of Title IX, a federal anti-discrimination law. It urged schools to set up committees to adjudicate complaints of sexual wrongdoing, even of heinous crimes such as rape. These committees often consist of untrained professors, administrators and students. The director of a campus bookstore served on a judgment panel for one college last year.

Under this system, defendants and victims have no right to legal counsel and no opportunity to cross-examine witnesses. Colleges typically determine guilt based on the civil “preponderance of the evidence” standard, meaning it is more likely than not that the perpetrator committed the crime, rather than the far tougher “beyond a reasonable doubt” standard, which is used in criminal courts. Panels cannot jail wrongdoers, but they can expel them.

Students on both sides of the fence have complained that these amateur tribunals are inept. A lawsuit this year alleged that Columbia University unfairly allowed perpetrators to remain on campus. Meanwhile male students at Vassar, Duke, and the University of Michigan have sued their schools, claiming that campus committees found them guilty of sexual misconduct when they were innocent. At Harvard 28 law professors recently criticised the university’s new sexual-assault procedures as lacking “the most basic elements of fairness and due process”.

Critics of the system argue that crimes should be dealt with by the police and the courts. In colleges as in the wider world, most rape victims never report the attack to the police. Studies suggest that the vast majority of campus assaults are committed by a small fraction of college men who tend to rape over and over again. So campuses would be safer if these habitual offenders were swiftly identified and arrested, rather than just expelled—leaving them free to go to another college and rape again.

Other critics think that colleges—and the government—should regulate alcohol more realistically. Binge-drinking is common on campuses, and cited in many complaints of sexual transgressions. But because students under 21 have no legal way to obtain alcohol, they tend to party in



places where there is no adult supervision nearby, such as in fraternity houses, which are not technically part of the university. The head of the University of Virginia notes that students at frat parties often have no idea how strong their drinks are. (At some parties, the hosts mix everything up in a trash can.)

The lack of adult supervision has had dire consequences: men in fraternities are three times more likely to rape than other men on campus, according to John Foubert of Oklahoma State University. If the drinking age were lowered, parties could be held on campus and colleges could supervise them better, critics say. ■

Louisiana politics

Landrieu's end

NEW ROADS, LOUISIANA

Democrats face oblivion in another part of the Deep South

LOUISIANA used to be famous for its colorful, populist Democrats. In the 1930s, Governor Huey Long promised to make “every man a king” (his main legacy is the art-deco capitol building in Baton Rouge; its walls still contain the bullet holes from the volley that killed him). In 1991 Edwin Edwards, a flamboyantly corrupt governor, defeated David Duke, an ex-Klansman, with bumper stickers that read “Vote for the Lizard, not the Wizard”.

These days, the Pelican state’s Democrats are more sober, yet endangered. Senator Mary Landrieu, a Democrat, faces a run-off election against Bill Cassidy, a Republican, on December 6th. If she loses, as seems likely, it will be the first time since Reconstruction in the 1870s that Louisiana does not have a white Democrat in Congress (assuming that Mr Edwards, who at 87 is running for the House of Representatives, also loses).

When Ms Landrieu was first elected in 1996, Democrats were still fairly strong in

Louisiana. Bill Clinton won the state with 52% of the vote, and Ms Landrieu joined another Louisiana Democrat, John Breaux, in the Senate. But since then, the state has turned red. In 2012 Mitt Romney defeated Barack Obama here by 17 points. Ms Landrieu’s political longevity owes much to her family (her father was mayor of New Orleans in the 1970s; her brother is now), her political abilities (she is a forceful centrist) and a solid dose of luck.

That now seems to have run out. According to Pearson Cross, a political scientist at the University of Louisiana, Democrats such as Ms Landrieu have held on in Louisiana for longer than in other parts of the Deep South by appealing to a coalition of black voters, who are concentrated in New Orleans, and rural whites, especially French-descended Catholic Cajuns, who unlike Protestants in Mississippi and Alabama have tended to back Democrats. Alas for Ms Landrieu, black voters tend to stay at home during mid-term elections, especially run-offs. And white voters—Cajun or not—have largely deserted the Democrats. In the first round of voting on November 4th, Ms Landrieu won just 18% of the white vote.

Ms Landrieu used to have a useful reputation for grabbing federal taxpayers’ cash to create jobs in her home state. After Hurricane Katrina, for example, she threatened to block every one of George Bush’s nominees for important jobs until Uncle Sam gave Louisiana \$6 billion to repair the levees. In 2009 she did not agree to vote for Obamacare until she won a \$300m sweetener that Republicans dubbed the “Louisiana Purchase”.

Yet her latest attempt to show off her clout ended in humiliation. To help her win re-election Harry Reid, the Democrat who will remain Senate Majority Leader until January, allowed a vote on a bill she had sponsored to approve the Keystone XL pipeline, which would bring oil from Canada to Gulf coast refineries (and so boost the Louisiana economy). The vote was for show, since Barack Obama had promised to veto the bill. But it never came to that: it was defeated in the Senate by one vote.

Ms Landrieu’s best hope now is that with control of the Senate not in any doubt, Republicans will stay home. Or that some of the mud she is flinging at Mr Cassidy will stick. At an event in New Roads, a small town north of Baton Rouge, Ms Landrieu spent most of her time questioning whether Mr Cassidy actually did the part-time work for a local hospital that he was paid for (in his previous career, the congressman was a doctor). He says that the allegations are a slur, although he has not produced any evidence that he actually turned up. Still, Ms Landrieu should know that Louisiana voters are remarkably tolerant of rogues. These days, it is Democrats they dislike. ■

Clarification: Last week we said that Harvard “rejects thousands of students with perfect SAT scores every year” (“Harvard under fire”, November 29th). We meant that it rejects thousands who score perfect marks on at least one of the SAT papers, not all three.



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LAS
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Lexington | Rick Perry's no-frills airline

The governor of Texas thinks his state's thrifty model will appeal to America



COWBOY swagger can be a great look—until the strutting hero trips and falls flat on his face. Governor Rick Perry of Texas learned that in 2011. For a heady moment he led the field of Republicans seeking the presidential nomination. Then came the fall. An ill-prepared Mr Perry was stunned when rivals attacked him from the right, denouncing his (admirable) policy of offering subsidised university places to Texas residents, regardless of immigration status, in the interests of a skilled workforce. The end came with an “Oops” heard around the world, uttered during a TV debate in which—flustered and battling severe back-pain—Mr Perry forgot which federal departments he wanted to abolish.

Now, as he prepares to retire as Texas's longest-serving governor, Mr Perry is poised for a re-launch. Think-tank boffins and foreign-policy gurus have descended on the Ionic-columned governor's mansion in Austin, briefing him on everything from monetary policy to Islamic extremism. He has talked geopolitics in London and Warsaw and debated energy policy with Communist bosses in China. On December 2nd he invited donors to lunch. Wisely, he offered more than happy-talk. When voters handed Republicans big wins in the mid-term elections it was no declaration of love for the Right, he told guests. Theirs was a vote of no-confidence in Barack Obama, and a cry of despair at Washington dysfunction and the lack of respect enjoyed by America abroad. Voters are offering Republicans one more chance to govern, with the message: “Don't blow it.”

Not blowing a fresh White House bid is Mr Perry's own mission. Last time he was “a bit arrogant,” he admits in an interview at his mansion, reclining in an armchair flanked by busts of Reagan and Churchill. He mistakenly assumed that running Texas was preparation for a presidential bid. This time, he has spent 22 months preparing “intensively”.

Pundits are asking: is Rick Perry ready? When asked, prominent Republicans advising Mr Perry offer warm words: they call him “energised” and “intellectually curious”. The difference from 2011 is “night and day”, says one. The governor will make a final decision next spring. In an unexpected twist, he was recently indicted for abuse of power, after leaning on an Austin prosecutor to resign after her arrest for drunk-driving. His indictment (which even some liberal jurists think looks like the hounding of a gover-

nor for doing his job) will either go away or stop him dead. Time will tell if he is up to a fresh run, but that is the wrong question. A better one is: what does Mr Perry stand for?

Any answer must begin with his governing record. A “Texas miracle” say boosters, pointing to the millions who have moved to his state in recent years, drawn by low taxes, cheap housing, light-touch regulation and courts that take a dim view of frivolous lawsuits. Mr Perry is keen on comparisons with highly-taxed, regulation-choked California, or as he calls it, the state from which he poaches employers “on a regular basis”. During his 14 years as governor, he beams, a third of all net jobs created in America were created in Texas.

A mirage, retort many on the Left: Mr Perry rode an energy boom and stole jobs from other states with tax breaks and other bribes. Millions in Texas lack health insurance. The state tolerates horrible inequalities. Sceptics charge that an extremist lurks behind the governor's charm, whether he is attacking the federal government for leaving a lethally “porous” border between Mexico and Texas, or displaying a serene confidence as he signed off on 279 executions as governor. If people move to Texas—such critics murmur—it's because they are happy with crappy.

Americans don't move to crappy places, retorts Mr Perry. He reels off statistics about the Texan quality of life: the number of well-paid new jobs, the 35,000 doctors who arrived once dodgy lawsuits were curtailed, even the number of theatre seats in Houston (only New York has more, he says). The Texan way is a choice, he says: the state offers people as much government as they want, rather than what Washington thinks is good for them.

You get what you pay for

This, surely, will be Mr Perry's contribution to the debate if he runs. Reduce modern politics to their essence, and some of the angriest arguments turn on a crisis of affordability. Most households have seen their incomes stagnate while certain essential middle-class goods (such as college education and health care) have soared in price. Too many Democrats seem to think that the solution is to pluck more money out of a magician's hat. Some suggest that new taxes can painlessly fund more government largesse, or insist that firms can easily afford to pay higher wages. Too many Republicans put their faith in magical policies: hinting that tax cuts and deregulation alone will return the economy to a Golden Age of affluence.

Mr Perry stands out for tackling, squarely, the fact that Americans are used to services that increasingly cost more than they (or any government) can afford. Rather often, the Texan solution involves basic services that aim to be cheap but good enough. Call it the low-cost airline model: offering a minimal service that is safe and reliable, then letting consumers pay for frills and extras if they like. Mr Perry grumbles at the idea that Texas is a discount model for anything. But competition is certainly at the heart of his pitch. He has pressed Texan colleges to offer degrees for only \$10,000, for example. He has rejected Obamacare's calls to expand health coverage on Washington's terms. He thinks that Texas should be allowed to cover the poor as it sees fit (with an emphasis on creating jobs that make health care affordable, rather than safety nets). As president, he would be delighted to let other states offer onerous taxes and lavish services. Some people want such things, he agrees: they are “free to live in California”.

Not everyone wants to live in Texas. But Mr Perry's pitch is worth debating. Forget that “Oops,” and hope that he runs. ■

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Colombia's war

Picking up where they left off

BOGOTÁ

The release of a kidnapped general allows peace talks to resume

IT WAS a kidnapping that ended peace talks between Colombia's government and the FARC, a leftist army, in 2002. Guerrillas hijacked a commercial flight, forced it to land on a remote road, and took captive Jorge Eduardo Géchem, a senator. The then president, Andrés Pastrana, declared the three-year-old peace process over. Mr Géchem spent six years as a hostage.

The abduction on November 16th of Rubén Darío Alzate, a Colombian general, and two companions could have snuffed out the latest peace talks in just the same way. The general was the highest-ranking military leader ever to fall into the hands of the FARC, which sees officers as its most prized prisoners. The kidnapping caused a crisis. Colombia's president, Juan Manuel Santos, suspended the negotiations. But General Alzate and his two companions waited only a fortnight to be freed (two soldiers nabbed in a separate incident were released earlier). Mr Santos promptly dispatched negotiators to Havana, who agreed to restart talks there on December 10th. The two sides also agreed to resolve future disputes through the talks' "guarantor countries", Cuba and Norway.

The quick resolution of the crisis is a sign of how much both sides have at stake in the peace process. Mr Santos wants an end to the conflict, which has dragged on for 50 years and killed some 220,000 people, to be his political legacy. He has pursued it despite sniping from politicians of

both the left and the right. Most voters warily back him. A poll (conducted before the kidnapping) found that 55% support the talks, though almost as large a share doubt that they will succeed.

The guerrillas need peace even more. Over the past decade they have been driven into inhospitable jungle and mountain terrain. They can fight on, and still wound, but cannot overthrow Colombia's democracy and free-market economy. The FARC has tacitly accepted this. It is therefore in effect negotiating the most advantageous terms for its surrender.

But that does not mean that reaching an agreement will be easy. Since the talks began in November 2012 the two sides have struck agreements on three of the five areas of negotiation: rural development, political participation for the rebels and the fight against drug-trafficking. What remains are the thornier issues of who will be punished for the FARC's crimes and how the guerrillas will disarm, demobilise and reintegrate into society.

When the talks resume, it will be in an atmosphere of heightened suspicion. The two sides had agreed that acts of war would not affect the talks. The FARC accuses Mr Santos of breaking that understanding by suspending them after the kidnappings. But he had little choice: anything less would have weakened public support for the peace talks and the military's flimsy backing for a process that puts its future in

doubt. In a television interview on December 2nd, Mr Santos made a surprising allusion to discontent within the ranks. Any officer who shows "the least bit of disloyalty or lack of discipline is out of the armed forces," he warned. General Alzate has already resigned for breaching security by travelling into a dangerous area dressed as a civilian and without a security detail.

The FARC, too, broke a rule. It had agreed to give up its decades-old practice of kidnapping as a precondition for starting the peace talks. Although the guerrillas regard soldiers as legitimate targets for capture, few Colombians do.

The FARC insists that a bilateral ceasefire is the only way to avoid clashes that could jeopardise the talks again. Colombia's right-wing opposition says it is the guerrillas who should stop shooting. Neither is likely to happen. The FARC has used previous ceasefires to regroup and rearm. Keeping up military pressure "is the most effective way to end this absurd war," Mr Santos declared recently. For the FARC to declare a permanent unilateral ceasefire would be to admit defeat; it is not yet ready to do that.

Some de-escalation might help, even so. Talks in Havana aimed at reducing the intensity of the hostilities had been under way between Colombian officers and some of the FARC's military leaders when the general was kidnapped. Perhaps these can now be resumed.

The government hopes to reach a final agreement by February 2015 so that a referendum on the settlement can be held to coincide with local elections next October. The swift resolution to the kidnapping crisis suggests that both the government and the FARC want to end the war. Whether their political will is strong enough to bring about agreement on the terms of peace should soon become clear. ■

Protests in Mexico

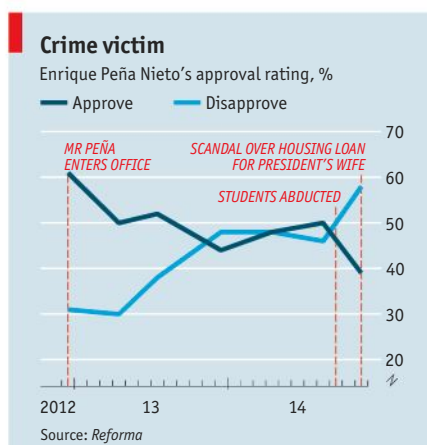
¡Justicia!

MEXICO CITY

The president proposes laws to fight crime. Mexicans want more than that

AN UNUSUAL cry has rung out in recent weeks at football matches, rock concerts and protest marches in Mexico. Crowds of people chant in unison the numbers from one to 43, representing each of the students who disappeared in September in the south-western state of Guerrero. They end with a shout: “¡Justicia!”

They are not merely demanding justice for the missing 43, who the government claims were massacred by municipal authorities and drug-traffickers. The cry also appears to reflect an exhaustion of patience with a system—political, economic and legal—that exempts from the rule of



law those who can buy or bargain their way around it, such as corrupt politicians, privileged businessmen and narcos.

The call unites left and right, though no political party has seized upon it. “We haven’t had this sort of demand since the [1910-17] revolution,” says Sabino Bastidas,

a political analyst. “It’s no longer for democracy or security. The biggest inequality in Mexico is in the justice system.”

President Enrique Peña Nieto responded to the clamour on December 1st, his second anniversary in office, by sending seven proposed constitutional amendments to Congress. Borrowing from the example of West Germany in the 1970s, they aim to replace Mexico’s 1,800 municipal police forces with 32 state forces and to make towns pay state governments for security. The federal government would gain the power to take over a local one if it had been infiltrated by organised crime. German unification in the 1990s inspired another reform: a diversion of resources from rich regions to the impoverished south, where criminality has taken root.

Many of the proposals are contentious and not all are well conceived. Some municipal police forces—such as those of Tijuana and Ciudad Juárez—have been transformed for the better in recent years, and now outperform their state equivalents. In some states, governors and their police forces are just as corrupt as the municipal authorities.

In handing the bills to Congress rather than taking executive action, Mr Peña has given the opposition a chance to block the package. He can no longer rely on the so-called Pact for Mexico, which he struck with the opposition two years ago to enact economic reforms. It is dead.

Mexicans will have to wait until next year for measures to address directly the inequities in the justice system. In presenting his police reforms, Mr Peña acknowledged the need for them. He spoke of “day-to-day” injustices—a woman unable to obtain a divorce judgment, a worker whose employer refuses to pay him. Resolving such complaints through the legal system is so costly and time-consuming that most people do not bother. Mr Peña has asked a university in Mexico City to come up with proposals within 90 days. ►►



More enlightened than her government

Drugs policy in Canada

Local heroin

VANCOUVER

Legal narcotics in a liberal city

THE people queuing up at the Providence Crosstown Clinic are pioneers of a sort. They are heroin addicts whose habits have resisted conventional treatment. They hope to become the first in North America to get their fixes legally as part of a treatment programme rather than just for a clinical trial. “It’s heroin that you know is good,” says one addict waiting outside, who aspires to join the queue.

Some European countries, including Germany and Switzerland, prescribe heroin for the most severe cases of addiction. Patients taking heroin are less likely to use illicit drugs and drop out of treatment than those who use methadone, a substitute. Vancouver’s eagerness to follow is not surprising. It has long had Canada’s most liberal drug policies, and it has a big problem. Addicts congregate in Downtown Eastside, two derelict blocks right next to tourist attractions and the financial district. In the late 1990s the city had the highest rate of HIV infection outside sub-Saharan Africa.

Across the street from the Crosstown clinic is one where addicts can take drugs they buy off the street under supervision of the health authorities. But that does not guarantee safety. In October 31 people fell ill from a bad batch of street heroin. The Crosstown clinic, by contrast, is prescribing top-quality stuff—diacetylmorphine made in Switzerland—to 120

people whose addictions are tenacious enough to warrant the treatment.

The hope is that they will take safer drugs, lead more regular lives and eventually move to methadone. For some, the alternative is “to inject in an alley using heroin that they didn’t know for certain where it came from,” said Scott MacDonald, a doctor at the clinic. “This has become the only choice.”

The federal government, which has jurisdiction over drugs policy, disagrees. It wants to deny the exemption for research under which the drugs are being administered. Giving addicts “the very drugs they are addicted to” does not help them, says Rona Ambrose, the health minister in the Conservative government. A group of addicts took the matter to British Columbia’s Supreme Court and won a judgment that to withhold treatment might cause “irreparable” harm. The programme, which had been interrupted, resumed on November 27th under the court’s protection.

But the ruling has force only until Canada’s Supreme Court weighs in on the case, which is expected to happen in 2016. Until then, addicts will find relief at the Crosstown clinic up to three times a day. One woman has been trying to break the habit for nine years but the struggle feels as if it has been going on “for 90 years at least”. For a while, that struggle will be a bit safer.

▶ He only vaguely addressed the other subject that has darkened the mood since the disappearance of the students: the ethics of politicians. Mexicans have been scandalised that the mayor who allegedly ordered the killings went uninvestigated by federal authorities. Then they learned that the president's wife had taken a multi-million-dollar housing loan from a company connected to a construction magnate who has won recent government contracts. Although Mr Peña has denied any conflict of interest and published a list of his assets, the revelations have hurt his credibility. Politicians from all parties are

often exposed for using public money as electoral slush funds.

Luis de la Calle, an economist, says that Mr Peña's judicial reforms should target politicians' vested interests, just as the economic reforms targeted those of big business. This can partly be done by strengthening institutions of transparency and accountability. Mr de la Calle suggests limiting the time allowed for electoral campaigning, so that politicians see less need to finance themselves illicitly. Eventually, he believes, a new focus on law and order will make Mexico a more modern country.

But time is not on Mr Peña's side. His

popularity has slumped (see chart on previous page). Demonstrations that formerly focused on the missing students have become a clamour—albeit a futile one—for his resignation. On December 1st protesters set fire to public vehicles in Guerrero and smashed windows on Mexico City's main boulevard. Guillermo Valdés, the intelligence chief in the previous government, says the risk is that peaceful protesters may join the violent ones if they feel their demands are being ignored. For his own sake, as well as Mexico's, Mr Peña needs to establish a system of justice that people can trust. ■

Bello | The Cuban question

Barack Obama could ease the embargo, but Congress may slap sanctions on Venezuela

HAVING got immigration reform off his chest, will Barack Obama unsheathe his executive-order pen again to tackle another intractable subject on which Congress has blocked change for decades? The United States imposed an economic embargo on Cuba back in 1960 as Fidel Castro was forcing communism on his people. The embargo was meant to topple Mr Castro. Today he enjoys a tranquil retirement in a Havana suburb while his slightly younger brother, Raúl, runs the country.

The embargo has not just failed; it has also given the Castros a potent propaganda weapon. It still has diehard defenders in Congress, which under a law from the 1990s is the only body that can repeal it. Even so, Mr Obama has some scope to change the policy. Indeed, in his first term he lifted restrictions on travel and remittances to the island by Cuban-Americans. There are several reasons why he might now want to do more.

First, support for the embargo across America is crumbling. A nationwide poll taken earlier this year for the Atlantic Council, a think-tank, found that 56% of respondents favoured improving relations, while more than 60% of Latinos and residents of Florida did. Second, Cuba is itself starting to change. Under reforms launched by Raúl Castro, 1.1m Cubans, more than a fifth of the labour force, work in a budding private sector of farms, co-operatives and small businesses. Access to mobile phones and the internet has grown. Opposition bloggers such as Yoani Sánchez, though often harassed, have not been silenced.

The third reason for action is that Cuba is one of the few issues that unites Latin America. The region is unanimous in believing that, notwithstanding its Communist regime, the island should be accorded



a normal place in relations in the Americas. That consensus lies behind the decision of Panama to invite Raúl Castro to the Summit of the Americas, a gathering that it is due to host in April. The previous six summits have been restricted to the hemisphere's democracies.

This leaves Mr Obama with a dilemma. This is not so much over whether or not to attend. He probably will. Rather, it is whether to act between now and then to stop the embargo becoming an issue that dominates the summit. Mr Obama could, for example, issue a general licence for all Americans to travel to Cuba. He could also remove Cuba from the State Department's list of "state sponsors of terrorism", on which it sits alongside only Iran, Sudan and Syria. There are no grounds for Cuba still to be there. In October the Financial Action Task Force, an inter-governmental body, removed Cuba from its watch list of countries doing too little to prevent money laundering and terrorist financing.

But the administration has not yet asked the State Department to remove Cuba from its terrorism list. Although Mr Obama has little to lose from loosening the

embargo, he also has little to gain. Raúl Castro's economic reforms have stalled recently; he never intended them to lead to political change. The Cubans show no sign of being prepared to release Alan Gross, an elderly American aid worker jailed for illegally handing out telecoms equipment. They want to swap him for three Cuban spies serving life terms for snooping on hardline exiles in Miami.

Even so, it would be surprising if Mr Obama did not take some action on Cuba before the summit. Oddly, pushback from the defenders of the embargo in Congress may take the form of sanctions on Venezuela, which provides the island with a subsidy (in the form of cheap oil) equal to perhaps 15% of its GDP. A bill to deny visas and freeze bank accounts of Venezuelan officials implicated in the repression of protests earlier this year is stalled in the Senate. Once the new Republican majority takes control in January, it is likely to move forward. Anthony Blinken, Mr Obama's nominee for deputy secretary of state, told a Senate committee on November 19th that the administration "would not oppose" this—a reversal of its previous stance.

For anyone who wants to see change in Venezuela, this is depressing. The plunging oil price and economic mismanagement are weakening President Nicolás Maduro's elected authoritarian regime. The crucial issue is ensuring that a legislative election next year is free and fair. Sanctions, however limited, will boost Mr Maduro's declining popularity and give him an excuse to crack down, as some opposition leaders recognise. The lesson of Cuba is that pressure from Washington does not lead to democratisation. It would be a sad irony if the beginning of the end of one futile embargo coincided with the birth of another.



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Japan and Abenomics

Moment of reckoning

TOKYO

Shinzo Abe's expected victory in next week's snap election will leave him no excuse for further backsliding on structural reform

THERE is little doubt that Shinzo Abe, Japan's prime minister, sees himself as a leader with an historic mission. In an interview with *The Economist*, he recalled the revolutionaries from his home prefecture of Yamaguchi who in the 1860s overthrew the old order and transformed Japan into an industrial powerhouse. Now, as then, he argued, Japan has to overhaul itself to catch up with the outside world. Also as then, his domestic opponents are united. "Far-reaching change was necessary for Japan, and my seniors in history staked their lives to achieve it, even though reform did not necessarily win backing from the majority," he says.

Mr Abe's supporters have been surprised by how little political capital he has spent on his own economic plan. After his landslide victory in December 2012, he fired up the country with talk of three economic "arrows": radical monetary easing, extra public spending and bold reforms in the way Japan's calcified economy works. He has governed in a hyperactive style, jetting off to dozens of countries in a diplomatic offensive. Yet he has shown far less vigour in pushing through the tough, market-oriented reforms that he has repeatedly promised.

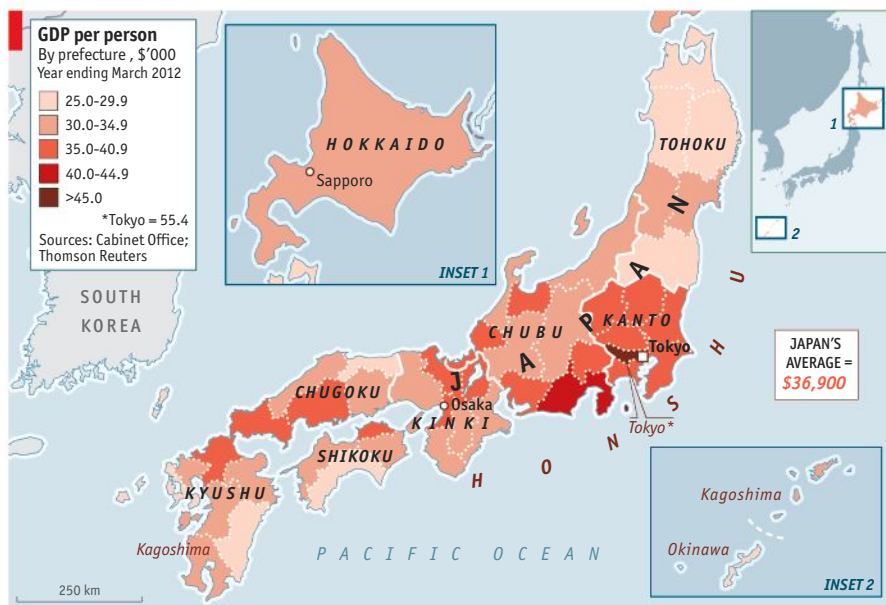
Now Mr Abe claims that he needs yet another mandate from voters to implement Abenomics, as his reform programme is commonly known—even though his government already possesses a thumping majority. The snap general election he has called for the lower house

of the Diet, or parliament, on December 14th, follows a run of bad news that has put his government on the defensive.

The economy is still struggling after a rise in the consumption (value-added) tax in April from 5% to 8% that crimped household spending. Falling GDP in the latest two quarters means that Japan is technically in recession, although revised figures to be announced on December 8th could show that the economy shrank from July to September by less than originally suggested, possibly close to zero. In October year-

on-year core inflation (excluding the impact of the tax rise) fell to 0.9%. It may decline further, thanks partly to falling oil prices. This suggests that Mr Abe's monetary arrow is falling well short of his target to reach 2% in 2015-16—even after an extra round of easing announced in late October. And an unwelcome reminder of Japan's gargantuan pile of debt, now at over 240% of GDP, came on December 1st when Moody's downgraded Japan's credit rating in response to Mr Abe's move last month to delay a second rise in the consumption tax, from 8% to 10%, which had been due next year.

Unemployment has fallen to a comfortable 3.5%. Yet Mr Abe's popularity is sliding as Japanese outside the big cities complain that their standard of living has failed to improve or has even fallen. Wage rises have not kept pace with inflation and a weak yen has pushed up prices of imported goods. Wealth is far from evenly distributed. ▶▶



buted across the country. But the opposition parties are in such dire straits that Mr Abe's Liberal Democratic Party (LDP) is likely to sweep the board, losing few of its current 294 seats in the powerful lower house. Together with its Buddhist-backed coalition partner, Komeito, the LDP now has a majority, with two-thirds of the 480 seats. If, as expected, Mr Abe loses no more than 20-25 seats, rivals inside the LDP might be unable to pose a serious challenge to him for several years.

Armed with a fresh mandate, might Mr Abe at last become serious about reform? Time and again he has declined to do battle over tough measures. It has not taken public protests or workers' strikes to force a climbdown—merely the threat of clashes with bureaucrats and vested interests. For example, when the government met resistance over changing rules on overtime pay, which encourage employees to put in unproductively long hours, it responded by applying the new laws only to the best-off workers.

Many suspect that the reason for Mr Abe's backsliding may be that he is diverted by a passion (inherited, perhaps, from his late grandfather, Nobusuke Kishi, a post-war prime minister) to revise the country's war-renouncing constitution, which was imposed by America in 1946. He wants to reinterpret the constitution to allow Japan to come to the aid of allies if they are attacked. The proposed change has proved deeply unpopular and drained the government's energies. Some analysts believe that, as the scion of an illustrious political family, Mr Abe lacks the guile and force required to face down the traditionalist LDP, which, in the words of one of its parliamentary members, "doesn't understand the first arrow [monetary easing], loves the second [government spending] and hates the third [reform]."

To be fair, Mr Abe has been bold in some areas. His efforts to force Japanese companies to adopt nimbler and more accountable management practices are already bearing fruit. His drive to lift the status of women in the workplace is showing signs of altering pervasive sexism. As soon as next autumn the city of Osaka is due to allow thousands of workers from the Philippines and elsewhere to help Japanese families look after housework and children—a controversial guest-worker programme which the government plans to copy elsewhere.

There are thus some grounds for believing that Mr Abe really does intend, as he assured *The Economist*, to push structural reform after the election. At times he sounds like a true radical: pledging to promote mobility in the rigid labour market, slash waste in medical care, liberalise the electricity market and shake up Japan Agriculture (JA), a vast, monopolistic network of agricultural co-operatives.

By far the most important reform would be to overhaul outdated work practices. During Japan's long-ago high-growth past, firms competing for scarce talent deliberately tried to discourage employees from job-hopping. Unions still cling to ironclad protections for employees. There is a de facto ban on firing: judges can use precedent to insist on somebody being allowed to keep a job if dismissal is deemed not to meet "social approval". To skirt restrictions, many companies hire ever more low-paid "irregular" workers with few job protections.

The rising share of workers in such jobs, now almost two-fifths of those employed, has many knock-on effects. Young men stuck in irregular jobs are far less likely to

marry and start families, contributing to a low birth rate. Some, dissatisfied with their lot, join in the ranks of the far-right, contributing to worsening relations between Japan and its neighbours (see box).

What are the chances that Mr Abe might overhaul the labour market? At the labour ministry, a committee is said to be studying the possibility of using severance pay to cushion dismissals—a practice common in most developed economies. That would require an overhaul of the unemployment-benefit system. At present laid-off workers receive less than in other rich countries, and for a shorter time. An overhaul would encourage firms to offer more permanent positions. The opposition Democratic Party of Japan has pledged to

Japan and the war

Abe's demons

TOKYO

History is haunting Shinzo Abe

JAPAN'S imperious newspapers rarely issue apologies; two in six months is unheard of. In August, the liberal *Asahi Shimbun* admitted running stories based on discredited testimony by a former Japanese soldier who said he had corralled Korean women into wartime military brothels. Last week, the *Asahi's* conservative archrival, *Yomiuri Shimbun*, said sorry to its 10m readers for using the term "sex slaves" in many articles about so-called comfort women since 1992. Such language was "inappropriate", its editors said. This will inflame the issue.

The apology reflects an ideological war that has been waged for over two decades. Conservatives in Japan have fought to reverse an admission by a previous government of military involvement in coercing Asian women into sexual slavery during the second world war. They say the women were willing prostitutes who served the troops. Critics

accuse Japan of whitewashing the past.

Shinzo Abe, Japan's prime minister, is deeply entangled in this controversy. Several in his cabinet deny war crimes and say Japan has been bullied into expressions of guilt and remorse. Mr Abe is unhappy that events from 70 years ago dominate Japan's diplomatic relations with South Korea (at a G20 meeting in Australia last month, Mr Abe and South Korea's president, Park Geun-hye, spent 40 minutes talking about how to resolve their differences over the wartime women). He blames the *Asahi* for poisoning ties with Japan's closest neighbour and besmirching Japan's image abroad. Japan must regain its honour, he says. In an interview with *The Economist*, he said his heart ached thinking about the women. But he said previous governments had also taken his view that there was no proof of coercion.

Historians disagree. They say women were treated as the spoils of war throughout Japanese wartime territories. Some were driven into prostitution by poverty. Others were enticed with promises of legitimate work or marched into "comfort stations" at gunpoint. Revisionists who describe them all as volunteers are "completely wrong", says Haruki Wada, a former director of Japan's official compensation fund for the women.

The *Yomiuri's* retraction, which follows a similar move by NHK, a public-service broadcaster, is a victory for revisionists—and a pre-emptive strike. Since the *Asahi* retraction, the *Yomiuri* has run many articles berating its rival. The apology is a way of protecting the newspaper from counter-attack, while thumbing its nose at its ideological opponents.



Unable to forget



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▶ ensure equal pay for equal work, regardless of what sort of contract an employee has. This could goad Mr Abe into action.

Mr Abe suggests that his reformist credentials would get a boost from an early agreement on the Trans-Pacific Partnership (TPP), a free-trade grouping that includes America. He calls himself “the strongest leader pushing for an early conclusion” of TPP negotiations and says he has given clear instructions to Japan’s trade negotiators to be flexible. There are now signs that, despite a gap between America’s and Japan’s positions on trade in cars and agricultural products, a deal may be in the offing.

If it happens, the boost to Japan’s economy would be huge. High import duties combined with domestic protection mean that the Japanese have to spend on average 14% of their household budgets on food, compared with 9% for Britons and 6% for Americans.

Thorough reform of JA would help. It started as a support network for farmers, especially part-time ones. But it has swollen into a massive bureaucracy that sucks profit from farmers who depend on it for distribution, seeds and finance. It is impressive that Mr Abe is even considering reform of JA—it is a powerful political force. A bill aimed at getting this started is due to be considered by the Diet early next year. Mr Abe’s willingness to push it through will be a test of his post-election gumption.

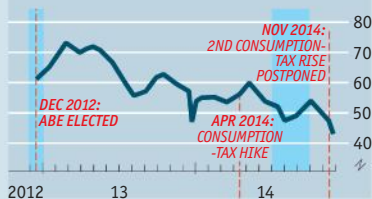
Another test will soon come over reform of the electricity market, which is badly needed to bring down high prices. Mr Abe says that for decades politicians have done nothing about either this or JA. Winning the election, he says, should lend his government the strength to deal with both. His plans include breaking up Japan’s powerful regional energy monopolies by requiring separate control over power-transmission and generation. Retreat would be hard for Mr Abe: one reform bill has already passed the Diet.

Mr Abe hopes that public support will help him overwhelm resistance from pressure groups. The extent of this will be difficult to gauge. Many Japanese agree in principle on the need for reforms. Yet they are far less interested in the nitty gritty of implementing them: their immediate impact is often unclear. The media tend to reflect the views of vested interests such as pharmacists, doctors and farmers. And, thanks to a skewed electoral system, the elderly in rural areas, who tend to resist change, have outsized influence. In some parts of Japan, a farmer can have twice the voting clout of a city-dweller because of falling populations in rural districts. On November 26th

Abe watch

Japan’s:

Cabinet approval rating, %



Consumer-confidence index*



Sources: Cabinet Office; Kyodo News; The Economist

*>50=optimistic, <50=pessimistic

the Supreme Court ruled that last year’s election for the upper house of the Diet, where disparities are wider still, was held in a state of “unconstitutionality”. Mr Abe has, however, been slow to tackle this.

Some politicians have misgivings about the wisdom of holding a snap poll when Abenomics seems to be in trouble, and grumbling about the economy is rising beyond the capital. “The oil is in the fields already and any wrong-headed comment by the prime minister or his ministers could set it alight,” says one LDP member of the Diet. Voter turnout is likely to be low. But with or without a mandate, it is time for Mr Abe to take up his mission and stake his all on change. ■

Rural development in South Korea

Pastures new

SEOUL

South Korea exports a rural-modernisation scheme from the 1970s

THAT South Korea changed from aid recipient to donor in a generation is a source of national pride. In 1961 its GDP per capita was \$91, then on a par with Bangladesh. Ferocious industrial growth has long been credited with transforming it into one of the world’s wealthiest countries. Now its president, Park Geun-hye, wants to remind the world of her country’s rural triumphs, too. She is touting a home-grown approach to modernising the countryside as a model for poor countries to follow.

The rural development scheme, known as the *saemaul*, or new village, movement, took off in South Korea during the country’s export-led boom in the 1970s. The UN has considered *saemaul* worthy of a four-year project to assess its merits, which it

launched this year. The government made plans to spend 26 billion won (\$23m) in 2014 on promoting the model in African and Asian countries. Last year it set up the Saemaul Globalisation Foundation to oversee this effort. Its head, Lee Ji-ha, describes Latin America as the new frontier for *saemaul* in 2015.

The origins of *saemaul* are recounted in South Korea as near-fable. In 1971 Ms Park’s late father, Park Chung-hee, who was then president, gave nearly every one of South Korea’s villages 335 bags of cement. Some used it to build bridges and pave roads, others replaced thatched roofs with tiles. After a year those thought successful (about half) received more cement plus steel rods. In return villagers were required to pool half their savings into local banks. The aim was to gather funds for money-making projects such as farming ginseng, chillies or oysters. Profits from these were to be spent on better seed-varieties and machinery. Gambling and boozing were stamped out (women’s groups organised card-burning rituals).

Saemaul-promotion abroad began before Ms Park took office last year. Since 2010 South Korea has set up about 25 pilot *saemaul* in six countries in Africa and Asia, including Rwanda and Uzbekistan, providing villages with technical training and grants. But now it is going big. This year it pledged \$8m in aid to Cambodia for a local *saemaul* training centre and 30 village projects; in Myanmar it is setting up 100. Last year students from countries from Nepal to Papua New Guinea began to receive masters degrees in *saemaul* studies at the Park Chung-hee School of Policy and Saemaul, established in 2011 in Gyeongsangbukdo, the birthplace of the original movement. Ms Park has taken a keen interest in pushing this revival of a development model that is so closely linked with her father, a military strongman who ruled South Korea for almost two decades. The budget for its promotion has grown by over a third since she came to power.

For a dusty agrarian policy, *saemaul* is remarkably divisive. Park Jindo of Chungnam National University in Daejeon says its resurgence under Ms Park suggests a political motive. The movement helped to strengthen rural support for Park’s dictatorship, he argues. Recalling those co-operative heydays gives Ms Park the chance to burnish her father’s legacy.

The movement did help to boost rural living standards. But even its defenders say the model will have limited impact elsewhere. In 1976 South Korea spent almost one-tenth of its entire national budget on *saemaul* programmes. State backing in South Korea for *saemaul* has not been this lively since its birth. But the enthusiasm of foreign villagers for the model could wither without lashings of their own governments’ support. ■

Correction: The chart with our story last week, “To the district born”, mixed up labels for the percentages of members of Japan’s Diet who are hereditary members. By 2014 these were 26% in the lower house and 19% in the upper house not the other way round. In the article, Jun Tsushima’s name was also misspelled. Apologies.

Thai politics

Delaying the day of reckoning

BANGKOK

A new political order takes shape as Thailand's elites vie for position before the next reign

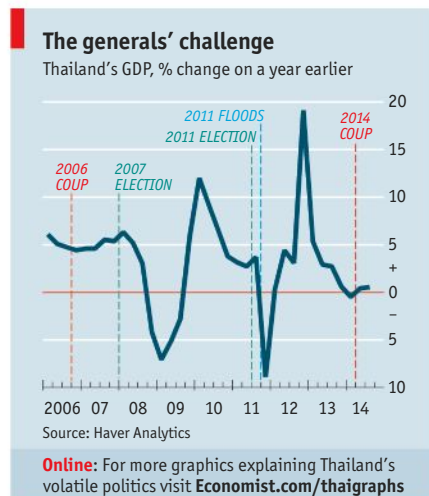
THE generals who have been running Thailand since their coup in May are eager to carry on doing so. Martial law, they now say, will stay in place “indefinitely”. Elections will be held, but not until early 2016—maybe. But keeping control of the country is not easy. Thailand's economy is stagnating and opponents of military rule remain legion. Intrigue relating to the royal family, an institution always central to Thai politics, is complicating the officers' calculations. On December 5th the ailing King Bhumibol Adulyadej turns 87. His son and chosen successor is beginning to assert himself.

At least on the surface, the generals appear to be enjoying themselves. Most of them were scarcely known among ordinary citizens before the coup; now they are celebrities. The coup leader and prime minister, Prayuth Chan-ocha, who retired as army chief in October, has a weekly television show: a rambling monologue called “Returning Happiness to the People”, which runs for about an hour. He may not be popular in the West, but he is no pariah. At multi-nation summits in Italy, Myanmar and China he has rubbed shoulders with world leaders. Since late last month Mr Prayuth has paid visits to Malaysia, Vietnam and Laos; all was smiles.

At home, however, there is little reason for cheer. The military government has been struggling to revive the economy. This year it is likely to grow by only about 1%, far less than in 2013 (see chart). Consumer spending has recovered somewhat since the coup. But investment, tourism, exports and industrial output are all down.

The generals, many now sporting ministerial titles, have not been helping. They have delegated economic policy to bureaucrats without giving them any clear sense of direction. The result is policy confusion. Mr Prayuth has been telling foreign investors that Thailand is open for business, but the bureaucrats have been sending a different message. In early November they dusted off plans to restrict foreign ownership and control of companies. The government has since rowed back.

In its efforts to reshape Thailand's troubled politics, the junta has been far busier. But the results have been no more encouraging. The junta has appointed establishment figures to write a new constitution by September. The main author, worryingly, says the alignment of the planet Jupiter will ensure that the draft they produce will



have “fairness and wisdom”. His superiors, more ominously, say the aim of their renewed military intervention was to erase the influence of Thaksin Shinawatra, elder brother of Yingluck Shinawatra, the prime minister thrown out in the coup in May. Mr Thaksin was himself booted out as prime minister by a coup in 2006 but remains a powerful force from his self-imposed exile in Dubai.

Supporters of Mr Thaksin have won every election since 2001. This suggests the



No longer so close

generals will try to manipulate polls to stop parties loyal to him from regaining power. The new constitution is likely to prescribe a partially appointed lower house of parliament and a fully appointed senate. Mr Thaksin is rumoured to be less outraged about this than might be expected. The army has cracked down on his red-shirted supporters, but the red shirts have avoided sweeping recriminations by lying low. Unlike the rival pro-establishment Democrat Party, they have displayed remarkable unity.

Mr Thaksin can wait: he is on good terms with the king's chosen successor, Crown Prince Maha Vajiralongkorn, a capricious man of a very different cut from his staid father. Members of the conservative elite loathe him. They have long prayed that his sister, Princess Sirindhorn, might ascend the throne. Any chance of this has almost vanished. The crown prince is showing signs of putting his house in order in readiness for the throne. This was evident on December 1st when it was announced that members of the family of his estranged wife, Princess Srirasmi (see pictured), who are being targeted in an anti-corruption drive, had been stripped of their royal titles.

The generals do not want the public speculating about the monarchy, a vital source of their legitimacy. Mr Prayuth is a royalist who has vowed to root out critics of the monarchy. Lèse-majesté cases have increased. On November 4th a court sentenced a student to more than two years in jail for a Facebook posting that the judges said had insulted the monarchy. This month a military court has approved an arrest warrant for a Thai billionaire businessman accused, among other things, of citing the monarchy to make money.

But palace-watchers sense a change that could provide a way out of Thailand's political gloom. Prem Tinsulanonda, who is head of the king's Privy Council, is seen to have lost sway in royal circles. Mr Prem, who is 94, leads an ultra-royalist faction of Thai society that disapproves of both the crown prince and Mr Thaksin. This camp fears that the next king might conspire with Mr Thaksin to launch a radical overhaul of the monarchy.

Mr Prem's likely successor as a linchpin of Thai politics, Prawit Wongsuwan, is a mentor to Mr Prayuth who is now serving as defence minister. But Mr Prawit also served as army chief under Mr Thaksin. One of Mr Thaksin's foot soldiers says the two sides are in “constant conversation”. Could Mr Prawit be a go-between between Mr Thaksin's side and the generals? Optimists believe the generals might just have it in them to compromise: the army could claim it had played its chosen role as the only capable caretaker of a broken system. But in the opaque world of palace politics, bets would be unwise. ■



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Hong Kong and Taiwan

Losing hearts and minds

BEIJING, HONG KONG AND TAIPEI

Dissatisfaction with China in Hong Kong and Taiwan shows up on the streets and at the polls. The causes are strikingly similar

THE Communist Party's strategy for bringing the self-governing people of Taiwan into its fold has long been tricky seduction. Ply them with money and favours (and tourists from the mainland) if they play along, and with threats of cutting them off if they don't. Let them see how happy and prosperous the people of nearby Hong Kong are under Chinese rule.

That strategy is faltering. China is not winning hearts and minds in either Taiwan or Hong Kong. On November 29th voters in regional and municipal elections in Taiwan delivered a drubbing to the ruling Kuomintang party (KMT), which under President Ma Ying-jeou has forged closer economic links with Communist leaders in Beijing but has failed to soothe widespread dissatisfaction with the economy. More than 60% of the 23m people of Taiwan will now be governed by mayors who belong to or are supported by the Democratic Progressive Party (DPP), which opposes union with China. Mr Ma is now an unpopular lame duck serving his second (and final) four-year term, and the DPP has the early advantage in the presidential election due to be held in early 2016.

The electoral rout of the KMT is even more worrying to Chinese leaders seen in the context of Hong Kong, where protesters have been demanding more democratic elections than promised for 2017, when the position of chief executive comes up for a popular vote. After two months of huge demonstrations, the protests seem to be

near an end following violent clashes between police and demonstrators. Leaders of one protest group, Occupy Central with Love and Peace, have called for protesters to go home. Two encampments, one of them outside the government's headquarters, remain. But Hong Kong's leaders have wisely waited for public opinion to sour. On December 1st Joshua Wong, an 18-year-old from the student group Scholarism, turned to a new tactic: a hunger strike. Three founders of the protest movement, however, turned themselves in to the police. They were released without charge.

Anti-mainland sentiments still run high. A poll in October by Chinese University of Hong Kong found just 8.9% of respondents identifying themselves solely as "Chinese", the lowest figure recorded in the survey—and way down on 32.1% in 1997, the year of Hong Kong's handover. Nearly two-thirds identified themselves as a combination of Hong Konger and Chinese, but another 26.8% said they were just Hong Kongers, the highest share since 1998.

Polling tells a similar story in Taiwan. In a survey in June by National Chengchi University, 60.4% of respondents said they identified as Taiwanese, a record high and up from less than 50% when Mr Ma was first elected in 2008. Only 32.7% identified themselves as "both Taiwanese and Chinese", a new low.

China insists the problems posed by Hong Kong and Taiwan are separate. There is some truth in this. Voters in Taiwan, dis-

satisfied with the economy, have been aching to repudiate Mr Ma's party at the polls. In Hong Kong young people have been increasingly chafing over Chinese rule. There have been bits of cross-pollination between youth movements in both places, but with little impact on events in either. (Chinese officials, for their part, blame "hostile foreign forces" from America and Britain for fomenting unrest; a committee of British parliamentarians has been denied entry to Hong Kong on the grounds that they had unfriendly intentions.)

Yet many grievances of young people in both places are strikingly similar. They are unhappy with growing inequality of wealth and are wary of integration with the mainland. Well-connected mainlanders are increasingly seen as interloping competitors for jobs. Investors from the mainland (and, in the case of Taiwan, rich Taiwanese who live on the mainland) bid up property prices. Rising numbers of tourists from the mainland have raised consumer prices (the torrent continued to increase in Hong Kong even during the protests, to 4m visitors from the mainland in October, up from 3.4m in the same month a year ago).

And in both Hong Kong and Taiwan there is a sense that the economic embrace of the mainland has enriched only the elite—the tycoons who are seen to be controlling Hong Kong and rich Taiwanese entrepreneurs who back eventual unification. Young people find it difficult to find work in either place: unemployment for 20-24-year-olds in Taiwan is around 14%, and the jobs they find pay little, as wages have stagnated.

A turning point in Taiwan came early this year, when young Taiwanese were at the forefront of an occupation of the legislature that lasted for more than three weeks. The protest, known as the "Sunflower Movement", aimed to stop the legis- ►

lature ratifying a cross-strait deal that would have allowed greater liberalisation of trade in services. The pact ignited fears that an influx of Chinese businesses would overwhelm Taiwanese competitors and flood Taiwan with cheap Chinese labour. It has since been stuck in Taiwan's legislature without being ratified.

There seems little hope of more cross-strait dealmaking now. The results in the elections for 11,130 mayors, councillors and town chiefs represented "a total collapse of people's confidence in the government and the ruling party", says Jason Hu, who was voted out as mayor of the central city of Taichung. The KMT, which controlled four of the six main municipalities of Taiwan before the polls, emerged as victor in just one—losing even the capital, Taipei, long a KMT stronghold.

China's president, Xi Jinping, will not have been too shocked. He knew after the Sunflower debacle that he had work to do to build better relations with Taiwan. In June Zhang Zhijun, the director of China's Taiwan Affairs Office, became the first ministerial-level Communist official to visit Taiwan since 1949, when Chiang Kai-shek fled to the island at the end of the Chinese civil war. Mr Zhang also took the unusual step of meeting a prominent member of

the typically despised DPP. There was an air of magnanimity not seen in cross-strait relations in years.

But will China adjust its approach to Taiwan, or to Hong Kong? In the wake of the election even KMT supporters seem less keen on economic co-operation with the mainland. Media in China shrug off Taiwan's elections as "the chaos of democratic politics", but have no suggestions for making voters happier. Perhaps it would help if citizens in both places got more of what they wanted. In Taiwan the DPP plans to deliver just that, with such things as virtually free health care for the elderly, welfare for the underprivileged and lots of social housing. (Hong Kong's leader, Leung Chun-ying, won no sympathy for fretting aloud that "numerical" democracy would tilt policies towards the poor.)

There are signs of recognition in Beijing that the roots of discontent in Hong Kong must be addressed. On December 2nd an editorial in *Global Times*, a newspaper in Beijing, said that Hong Kong should manage its own problems. "The mainland shouldn't be tempted to quell the unrest with troops too easily," the newspaper said. "It can only bring temporary peace, but the deep-rooted cause will still linger."

■

voice proceedings mean the risk of losing custody of their children. Rather, victims are routinely advised by the police, women's federations and confidantes to sort out their problems at home. In a well-publicised case in 2011, Kim Lee, the former wife of Li Yang, founder of Crazy English, a popular language-training institute, posted pictures of her bruised face and bloodied ear on her microblog. Ms Lee, an American, had been advised by her Chinese sister-in-law to stop provoking her husband. The police told her to go home and relax.

The draft law offers a definition of domestic violence as "physical, psychological or other infractions committed between family members". It also provides directions on restraining orders and stipulates that a perpetrator of violence may be ordered to vacate a victim's residence—a striking provision in a country where most homes are owned by the men.

Feng Yuan, a women's rights advocate, has been calling on the government since 2003 to adopt a domestic-violence law. She calls the proposed law "significant" but plans to take up the call for comments from members of the public. She says the draft's definition of abuse—limited to between family members—is too narrow, and leaves the unmarried, those in homosexual relationships and the divorced unprotected. Sexual violence, a common form of domestic abuse, is not covered. And an article limiting the term of restraining orders to 30 days unless followed by a lawsuit ignores the many victims who are not certain they want to divorce their abuser—but merely want the pain to end.

Even after the law is passed, which might take months or even years, it could still be a long time before victims of domestic abuse see any benefit. Vast and unwieldy, China has many problems enforcing its existing laws. Cultural hurdles may make this one even harder to implement. But where the letter of the law leads, society may one day follow. ■



Domestic violence

Home truths

SHANGHAI

At last, domestic violence is to be outlawed

THE most recent occasion when Ms Fan's husband beat her until her eyes were black and blue was a row over 100 yuan (\$16). Ms Fan, who did not want to reveal her full name, is a 37-year-old cleaner. She helped her husband deliver gas canisters on the outskirts of Shanghai but hid some of the proceeds lest he fritter them away on gambling and booze. When he noticed the missing money, her lies did not convince him. "He hit me in the mouth until my lips split against my teeth," she says.

For more than a decade women's rights advocates in China have lobbied for a law to afford women better protection. On November 25th an office of the State Council, or cabinet, released a draft of China's first anti-domestic violence law. At last, the government seems serious about confronting an endemic problem.

Many Chinese families suffer violence. According to a report by the All-China Women's Federation, a state-controlled NGO, nearly 40% of women who are married or have a boyfriend have experienced physical or sexual violence. And it found

that about 53% of boys and 34% of girls are physically abused by their parents. Only 7% of those suffering abuse inform the police. Ms Fan has been abused monthly for two decades but has never reported her husband. She would feel "too ashamed".

Until recently physical abuse was not even acceptable grounds for divorce in China. The country's marriage law was amended in 2001 to ban domestic violence, but the term was vaguely defined and there was no national guideline for dealing with perpetrators. Leta Hong Fincher, author of the book "Leftover Women: The Resurgence of Gender Inequality in China", says it is widely accepted, especially in the countryside, that a husband as head of the household has the right to hit his wife. She says one reason the government has long dithered over the draft legislation may be because it is loth to be seen meddling in men's private affairs.

It is no surprise, then, that victims believe reporting abuse will do little good. Restraining orders are very hard to obtain. Women's shelters are few. For mothers di-

Banyan | The world is Xi's oyster

A confident Chinese leader sets out his foreign-policy store. It is not wholly comforting



XI JINPING, China's president, has lately had little choice other than to ponder foreign policy. Last month his country played host to the leaders of the 21-member Asia-Pacific Economic Cooperation forum; he then flew to Brisbane for a G20 summit, going on to visit other parts of Australia, New Zealand and Fiji. In between, his prime minister, Li Keqiang, was in Myanmar for yet another summit, the 18-nation East Asian one. This welter of diplomacy seems to have inspired Mr Xi—the most powerful leader in a generation of a country more powerful than for centuries—to spell out his foreign-policy vision. He did so in a speech at the end of November apparently intended in part to reassure China's neighbours that a strong and rising China need not be feared. It was a good attempt, but not entirely successful.

Reassurance is needed. Hopes that China's spectacular climb to superpower status might be completed without conflict have been dented in recent years. Its assertive approach to old but until recently largely quiescent territorial disputes with Japan, the Philippines, Vietnam and India has jangled nerves. In Asia, defence spending has risen sharply. America's allies in the region have encouraged America to "rebalance" its military might into Asia and begun to strengthen co-operation between their own armed forces. Relations between America and China have been marred by fraught public disagreements.

The forum for Mr Xi's speech was a high-level conference on foreign affairs in Beijing, the first such gathering since 2006. It was attended by his Politburo colleagues, senior soldiers and officials, including some ambassadors hauled back from abroad. The context and official media coverage suggested the speech was a big deal. It had three main messages. The first, which was largely implicit, was that China is now a great power and needs a foreign policy—and international respect—to match. Mr Xi seemed to suggest that China could no longer "hide its light" as Deng Xiaoping used to urge. The second is that the world order and China's neighbourhood are in flux. The trend, he argued, was to a "multipolar" world. But his audience would have understood this to mean that American power has begun to wane as China's waxes. The third is that, although China will be no pushover when its interests are threatened, this delicate process can be managed peacefully, as a "win-win" for it and the outside world. "Peace and

development" remain "the underlying trend of our times".

This third message inspires the most optimistic interpretation of the speech: that China has realised that provocative behaviour has not only already harmed its own interests by alarming friendly countries, but also carries the risk of unintentional conflict. The emollient words follow some magnanimous gestures. In Beijing Mr Xi had shaken hands with men his government previously regarded as untouchables, such as Benigno Aquino, president of the Philippines, and Shinzo Abe, Japan's prime minister (albeit, in the latter case, as if the act caused him physical pain).

Far from punishing Australia and South Korea for their churlish, American-encouraged refusal to join its new Asian Infrastructure Investment Bank as founder members, China rewarded them by concluding bilateral free-trade agreements. In meetings with regional leaders Barack Obama talked about Ebola, Islamic State and tension in the South China Sea; Mr Xi talked development and infrastructure and backed it up with tens of billions of dollars that China is ready to invest. Most striking of all, Mr Xi and Mr Obama announced a number of agreements, including on climate change and on confidence-building measures between the two armies, that transformed the tenor of their countries' bilateral relations.

But probably not their substance. America and China are too intertwined in too many ways not to co-operate in some. But that does not remove the sources of tension and rivalry. In a speech in Brisbane, Mr Obama outlined the alternative security orders that might dictate Asia's future: one based on "alliances of mutual security, international law and international norms that are upheld and the peaceful resolution of disputes"; or one based on "spheres of influence, or coercion, or intimidation where big nations bully the small". It was clear which country he thought was leading each order.

When he spoke to Australia's parliament in Canberra, Mr Xi went out of his way to stress that, although China was like "the big guy in the crowd", it would not push people around or stand in their way. But this was also a reminder that China sees even relatively far-flung parts of the Pacific, such as American-allied Australia, as part of its local playground, where it could act the bully if it chose. And his speech in Beijing left open the possibility that it might have to. It referred to the "grave nature of international tensions and struggle" and "the protracted nature of contest over the international order". Nor did Mr Xi's softer tone encompass any concession on China's disputes with its neighbours. It has not stopped building on disputed rocks in the South China Sea. And after the awkward meeting with Mr Abe that seemed at least to mark an easing of tensions over the disputed Senkaku (or Diaoyu) islands, it sent coastguard boats to patrol there.

You can't win-win them all

It is not just Mr Xi who hopes China's rise can be win-win. Its neighbours and America agree that a prosperous, strong China, comfortable with its place in the global order, is preferable to a poor, weak and angry one. But on some issues, it is impossible for both sides to win. China's territorial disputes, for example, with the possible exception of the one with India, which is big enough to allow room for a conceivable compromise, are zero-sum. Most fundamentally, China's aspiration for regional leadership challenges American naval supremacy in the western Pacific. And little so far suggests that any American leader would be willing to lose enough to let Mr Xi's China feel it had won. ■



Places apart

The world is becoming ever more suburban, and the better for it

THIRTY kilometres south of central Chennai, just out of earshot of the honking, hand-painted lorries roaring up Old Mahabalipuram Road, you seem to have reached rural India. The earth road buckles and heaves. Farmers dressed in Madras-checked dhotis rest outside huts roofed with palm leaves. Goats wander about. Then you turn a corner, go through a gate, and arrive in California.

Lakewood Enclave is a new development of 28 large two-storey houses, wedged tightly together. The houses are advertised as “Balinese-style”, although in truth they are hard to tell apart from any number of suburban homes around the world. Outside, the houses are painted a pale pinkish-brown; inside, the walls are white, the floors are stone and the design is open-plan. They each have three bedrooms (middle-class Tamil families are small these days) and a covered driveway to protect a car from the melting sun. Just one detail makes them distinctively Indian: a cupboard near the door for Hindu gods.

A quarter of a century ago your correspondent taught in a school not far from these houses. It was a rural area; bonnet macaques would sometimes invade his shower. Now farmers are selling their small parcels of land to housebuilders for sums beyond previous imagining. Commuters are rushing in so that, every morning, they can rush out again. Chengalpattu, the district where Lakewood lies (see map on next page—where the new development is also pictured), now contains more than half a million people. Lakewood looks likely to be the rule, not the exception. “The force of human nature means it will happen,” says Balaji Narasimhan of SSPDL, its developer. “You can’t stop it.”

The shift in population from countryside to cities across the world is often called the “great urbanisation”. It is a misleading term. The movement is certainly great: the United Nations reckons that the total urban population in developing countries will double between 2010 and 2050, to 5.2 billion, while the rural population will shrink slightly. But it is nothing like as obviously urban. People may be moving towards cities, but most will not end up in their centres. Few cities are getting more crowded downtown; ►

▶ between 2001 and 2011 Chennai added just 7% more people while Chengalpattu swelled by 39%. In developed and developing worlds, outskirts are growing faster than cores. This is not the great urbanisation. It is the great suburbanisation.

Suburbs are curious places, neither here nor there. They have been around since ancient Rome (which gave the world the word), but it was not until the 19th and 20th centuries that first the train and then the bus and car brought them truly into their own—the first places in human history where many people lived but far fewer worked. The idea of places with little purpose other than providing space for domestic life struck those from city and country alike as peculiar and diminished. In 1904 the *Times* worried that London would be surrounded by “a district of appalling monotony, ugliness and dullness”. That dullness was said to seep out of the suburbs’ tidily planned streets and into the minds of their inhabitants, giving rise to a condition known as suburban neurosis. To Lewis Mumford, an American urbanist writing in 1961, suburbia was:

a multitude of uniform, unidentifiable houses, lined up inflexibly, at uniform distances, on uniform roads, in a treeless communal waste, inhabited by people of the same class, the same income, the same age group, witnessing the same television performances, eating the same tasteless prefabricated foods, from the same freezers, conforming in every outward and inward respect to a common mould.

To observers like Mumford, suburbs were not just unfortunate urban appendages; they were anti-urban. They enabled a woman to opt out of the vibrant, sociable city, where she at least knew her local butcher and grocer, and live what he called “an encapsulated life” apart from others. Suburbs were machineries of isolation.

The financial crisis of 2008 turned bien-pensant concern and disdain into a new doom-mongering. The crisis hit the suburbs exceptionally hard: many, especially newer ones, became blighted by foreclosure; their economies, which rested on building and selling houses, collapsed. In 2012 Stockton, a previously fast-growing burgh in the suburban sprawl of the San Francisco Bay Area, became the biggest city in American history to file for bankruptcy. San Bernardino, another essentially suburban city, soon followed. In parts of California an uptick in cases of West Nile virus was blamed on the many abandoned swimming pools. At this point the argument against suburbia changed. It was no longer regrettable but inevitable. It was dead.

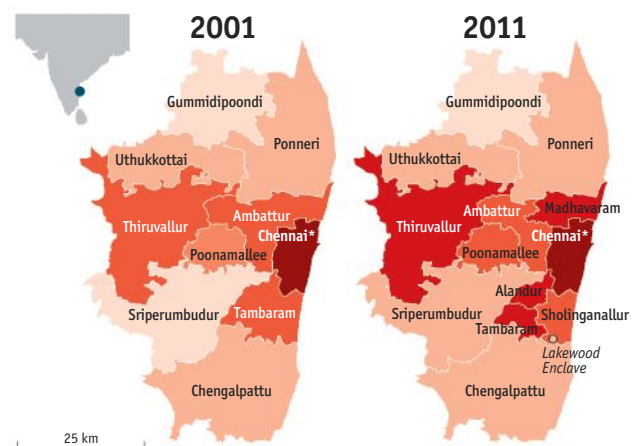
Leigh Gallagher’s book “The End of the Suburbs”, published in 2013, is not so much an attack on suburbia as a post-mortem assessment of its pathologies. Americans—especially young Americans—have turned against the car-oriented, low-rise life, she explains. They are flocking to city centres, where they live in rented apartments, take trams or walk to work, and hang out in coffee shops. The suburbs are left ever poorer and more criminal. In more subtle pieces of high-density triumphalism like “The Triumph of the City” by Edward Glaeser and “The Great Inversion” by Alan Ehrenhalt, suburbs are no longer a threat to successful cities. Instead, successful cities threaten them.

American suburbs undoubtedly have their problems, as this

Greater Chennai, Tamil Nadu

Population density, people per km²

0-500 500-1,000 1,000-2,500 2,500-5,000 5,000-15,000 >15,000



Sources: Indian census

* Totals: 2001 = 24,400; 2011 = 26,100

year’s riots and protests after the shooting of a teenager in Ferguson, a suburb of St Louis, show. Many suburbs are poorer than once they were, and a lot of city centres are much more attractive places to live than they used to be. Still, more than half of Americans now live in suburbs, and many of them do so by choice. The world as a whole is quickly following suit. In the 1950s Taiwanese planners toured Britain’s garden cities and returned to build some of their own. Orange County, north of Beijing, is a clone of the California suburb it is named after, even down to the kidney-shaped swimming pools. In much of the world people born in cities, or who came to cities young, are moving out, and incomers from the country do not manage, or aspire, to live right in the centre of their chosen city. Even as their populations grow, the density of metropolitan areas is dropping all around the developing world.

Those who argue that suburbia is dying are wrong on the facts; those who say it is doomed by the superiority of higher-density life make a far from convincing case. Cities that have sought to stop the sprawl—London is the most striking example—have achieved dubious benefits at great cost.

In one sense the critics are right: suburbs are a place apart. People who live close to the heart of buzzing cities can feel themselves part of a great project. Suburbanites have relinquished that, or forgone it. What they have gained in its stead is surprisingly consistent from city to city and from country to country. Suburbs are about family, ease and quietness. Searingly ambitious people find them dull, and some become alienated in them. But many others experience a humble liberation. DJ. Waldie, then an official in the southern California city of, as it happens, Lakewood, described his suburb as “adequate to the demands of my desire”. And to a great many other people’s desires, it turns out.



The quickening spread

"THE city is old," says Dhakshinamoorthy Dhinakaran, a property developer who has built a gated development of two-storey houses 35km south-west of Chennai and 15km from Lakewood Enclave. He has a point. Chennai is a scruffy place. The British, who called it Madras, left it with few grand buildings, and some of those it once boasted were subsequently razed in favour of shopping centres or new digs for Tamil Nadu's politicians. Many buildings look older than they are, and not in a good way—they have been corroded by hot sun and humid air. The sewers overflow when it rains. But outside Chennai, a new India is rising.

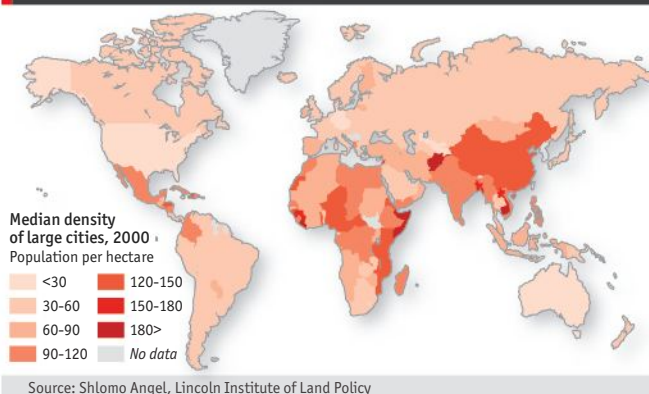
The roads out of the city are lined with half-finished four- and five-storey apartment blocks, most with man-sized figurines lashed to concrete pillars to ward off superstitious trespassers. Behind them, tidy family houses and high-rise apartment buildings are going up. Every other billboard seems to advertise new homes.

Chennai is spreading less because its inhabitants are desperate to leave the old city than because their jobs have moved. Carmakers have built factories outside the city, and workers have followed. Information technology has grown to the south. The World Bank calculates that, between 1998 and 2005, the number of IT jobs within 25km of the centre of Chennai increased by 27%. In the same period, 47% more IT jobs were added in an outer ring between 25km and 50km from Chennai. In high-tech manufacturing, the urban core lost about a quarter of its workers, while the outer ring gained 23% more jobs.

The biggest and most spectacular IT campus in Tamil Nadu belongs to Tata Consultancy Services (TCS). It looks like Optimus Prime taking a nap. The 60,000 people inside the Transformer look-alike do back-office tasks for Western firms and governments. One of them, taking a lunch break, is Karbagam Chandrasekaran. She lives at home with her parents in Chennai, and takes a bus to the campus each day—a journey of about an hour and a half. She likes city living for its convenience, but has heard that the schools are better in the suburbs, and would prefer to live closer to work. When she marries (young Indians almost always say "when", not "if") she expects to move out, particularly if her husband also works in the IT corridor.

More than 225 TCS buses run to and from campus every day, many of them carrying workers to and from homes in the old city. Other IT firms do the same, with the result that traffic jams towards Chennai in the evening are often worse than the jams in the opposite direction. But this is changing. Ravi Viswanathan, TCS's president for growth markets, says that new employees are more likely to live in the suburbs. Buildings are newer, rents are lower and well-regarded private schools have appeared, along with new hospitals and restaurants. At the weekend, Mr Viswanathan says, the main roads around TCS's campus used to be almost deserted except for cattle. Now they are thick with cars and motorbikes.

Congested development



Officials have periodically tried to rein in this sprawl. But, in common with many other Indian cities, the government is weak and indecisive, and the city is spreading so quickly that any plan is soon out of date. The boldest attempt to restrain sprawl can be found 45km south of Chennai. In 2002 Mahindra, a conglomerate, began building a large industrial park known as Mahindra World City. The idea—pushed by the Tamil Nadu government, which provided tax breaks—was to create a new city to take pressure off the old one. It has not quite worked out that way. Mahindra World City is successful: its 63 business tenants already employ 30,000 people. But as other businesses and homes sprout nearby, it feels less and less separate from Chennai's suburban sprawl. Mahindra World City has extended Chennai's suburbs rather than creating an alternative to the metropolis.

To Chennai's rather conservative inhabitants, this barely controlled spread seems evidence of official failure, and perhaps of official corruption. But it is not unusual. Other big Indian cities are losing jobs and people to the suburbs, too: the population of central Mumbai is actually falling. Chinese cities are sprawling even more extravagantly. Under the Maoist regime, they were mostly dense and organised into *danwei*—socialist production machines composed of factories, apartments and basic services. The introduction of market reforms severed the link between urban jobs and homes, priming a suburban explosion.

Just how powerful and widespread this centrifugal trend will be is suggested by the work of Shlomo Angel, a geographer at New York University. By using satellite images, old maps and population data, Mr Angel has run a ruler over some 3,600 metropolitan areas. He finds that, with few exceptions, they are less dense in wealthier countries (see map). Paris is less than one-third as densely populated as Cairo and barely one-seventh as dense as Mumbai. Even rich cities that seem packed are sparsely populated compared with poorer ones. Tokyo is only one-fifth as densely populated as Dhaka, for example.

Mr Angel also finds that almost every city is becoming less dense. In 1920 Chicago squeezed 59 people into each hectare of ▶▶



land; now, by his reckoning, it manages just 16. The urbanised area of Mexico City is about half as densely populated as it was in 1940. Beijing's population density has collapsed from 425 people per hectare in 1970 to just 65 people per hectare, or about the same as Chicago at its most crowded. Few metropolises are becoming more crowded, and most of those that are were exceptionally spread out to begin with, such as Los Angeles and Johannesburg.

The simple truth is that as people become richer they consume more space, just as they consume more energy, more goods and more services. Even if they live in towers, those towers are likely to be widely spaced, and the households that live in them will be small—wealth also being associated with small families. Mr Angel finds that population densities tend to drop when Chinese cities knock down cheaply built walk-up apartments and replace them with high towers. And many people will opt not to live in towers but in even less dense detached or semi-detached houses.

Wealth fuels sprawl. The process is happening apace in the developing parts of the world. In the developed parts, where cities and suburbs combined expect only 160m more people by 2050, it is largely over. There the question is whether it can be reversed.

The permanent present

FEW places on Earth are as suburban as Phoenix, Arizona. The city has never been any other way: it barely existed before cheap cars and has always been subject to their centrifugal power. It is now the sixth-most-populous city in America, part of an exceedingly spread-out metropolis of 4.4m people that also includes Mesa, Scottsdale and Tempe, their borders no more easily distinguished than those of algal blooms on a pond. Apart from a handful of office blocks dotted about the place, Phoenix seldom rises above three storeys, and much of it does not rise above one. Almost everybody can afford a house and a yard somewhere. "The richest people in Phoenix live on one acre [0.4 hectares]," explains Grady Gammage, a lawyer and local expert. "The poorest live on about one-fifth of an acre."

The extent of the sprawl is not set by people's willingness to travel. It is set by infrastructure. Look at Phoenix in satellite pictures taken at night and its bright blobbiness has a sharp edge quite unlike those of cities such as Boston and New York. There, dense suburbs slowly give way to loose, forested suburbs and eventually to rural hamlets (albeit occupied by people who tend to spread-sheets rather than the back 40). At the edge of Phoenix, suburb turns to desert about a block from where the mains-water supply stops. Phoenix is suburban in its heart, suburban at its extremities and suburban in between. But some in power wish it was not.

Evening out

Population in 100 largest US metro areas, % change on a year earlier



Source: William H. Frey, Brookings Institution

Walking around downtown Phoenix—an activity that takes barely half an hour—Greg Stanton, the city's mayor, points out a new high-rise student dormitory, new coffee shops, pocket parks and a 32km tram line installed in 2008. In a few spots, the dominance of the car has been challenged, albeit politely: large green flower pots have been plonked at the edges of roads, making them narrower.

When he gave his annual "state of the city" speech in March, much of it was devoted to downtown. Cities need dense, vibrant, youthful cores, he says. Young people are less keen on driving, partly because they cannot use their mobile phones while doing so. They wish to walk around and take trams (not buses: Americans associate those with the poor). To attract them, Phoenix must become more city-like. The tram network must be extended. High-rise apartment buildings should rise up next to its stations.

The mayor has improved the image of Phoenix a little. But neither he nor the many people who share his vision have been able to do anything about its fundamentally suburban, car-focused character. While a few people trickle into centrally located apartments, the fastest-growing places in Arizona these days are the suburban tracts on the edges of metropolitan Phoenix. Goodyear, an agglomeration of such tracts just to the west, grew by 12% between 2010 and 2013.

A few years ago, when foreclosure and rising petrol prices held American suburbs in a vice, confident predictions were made about their abandonment and the repopulation of city centres. William Frey of the Brookings Institution, a think-tank, has shown that urban counties are indeed growing in population more quickly than they did a decade ago, while suburban growth has slowed. The two are now roughly equal (see chart). This does not, however, mean that Americans are now equally drawn to central cities and to suburbs. The fastest-growing parts of the country are now nearly all suburban (the exceptions are urban New Orleans, still bouncing back from Hurricane Katrina, and rural North Dakota, which is fired by a shale-gas boom). Between 2007 and 2011 the 25 biggest county-to-county migrations in America were all from more urban counties to more suburban ones.

Between 2012 and 2013 the areas that the Census Bureau calls "principal cities" absorbed 3.3m migrants from elsewhere in America—but they shed 5.4m people, leaving a net loss due to in-country migration of 2.1m. Foreign immigrants and babies saved them from outright depopulation. The suburbs, meanwhile, added 5.8m domestic migrants and only lost 3.2m, suggesting their pull remains enormously strong. A big part of the attraction is schools; they are still often dire in the middles of cities.

Mr Frey's numbers show that the drop in suburban growth took place quickly, between 2006 and 2009. It was almost certainly the result of two sudden shocks: a tightening of mortgage lending standards caused by the financial crisis and a softening of the labour market. The bright lights of inner cities burn brighter these days, as they have tidied themselves up—but the young are also staying in them because they cannot buy homes. The drift to the suburbs may speed up as the economy returns to normal.

America's suburbs are not withering, but many of them have changed, in ways that can seem disturbing. Recent events have made Ferguson a distressing example. It is a suburb that has become mostly black but which retains a mostly white power structure, parts of which strike its black residents as oppressive. Still, other suburbs have adapted more easily. Among them is Levittown in New Jersey, studied by the sociologist Herbert Gans in 1958. When it was built, blacks were banned from living there. It is now known as Willingboro Township and is three-quarters black.

One of the biggest, oldest and poorest suburban developments in America is Maryvale, in Phoenix. It was built at great speed in the 1950s and sold just as quickly. But many of its white inhabitants fled in the 1980s following a strange cluster of leukaemia cases. Maryvale is now home to around 200,000 people, roughly three-quarters of whom are Hispanic. It has a dismal reputation. Most people in Phoenix associate it with "the cancer cluster, crime ►►

▶ and poverty,” explains Dwight Amery, a longtime resident. Three-bedroom houses can be bought there for less than \$100,000. Maryvale is even said to be roamed by packs of feral chihuahuas.

Many old American suburbs have gone downmarket in the same way, and this has been treated as proof that they are failing. To the extent that low property prices are a sign of low demand, this is correct. Yet the people who moved out of Maryvale did not pile into the city centre; they went to newer, more distant suburbs. And the district’s new Mexican inhabitants are probably better off there than they would be crammed into tower blocks. They have space and freedom—to paint their houses bright green, to build extensions for grandparents, to have barbecues in their front yards, to keep chickens (a few even keep horses). Some run small businesses out of the local shopping mall, which has been turned into a *mercado*. They probably suffer less crime than they would in a more densely populated area, too. Brookings, which has crunched FBI data, finds that violent crime has dropped steeply in principal cities since the early 1990s—but only to a level twice as high as in either old suburbs or new ones.

A few cities in the world appear to have undergone an actual “great inversion”. The best example is Tokyo, where the population is growing more rapidly within 10km of the city centre than farther out. This pattern, which cannot be found in any other large Japanese city, is partly the result of the dramatic shrinking of the Japanese family and the ageing of the suburban population. Old folk rattle around houses that once contained families. Tatsuo Hatta, an urban economist, says falling land values play a part, too: it is simply a bad investment to buy a large plot, of the kind that is mostly found in the suburbs.

Yet Tokyo is a rarity. American city centres sometimes seem to revive, as Chicago did in the 1990s, only to fall back again; meanwhile, their suburbs continue to expand. Years of vote-winning giveaways to police officers and firemen, combined with unrealistic predictions of stockmarket returns, have left some cities with giant holes in their pension funds. Chicago’s unfunded liabilities work out to \$18,596 per inhabitant, according to Morningstar Municipal Credit Research; New York’s amount to \$9,842. To fill these holes, cities must either prune services or raise taxes. Both answers were likely to drive residents to nearby suburbs, making the problem worse. No number of trams, coffee shops or urban hipsters will save cities that slip into this whirlpool.

Suburbs rarely cease growing of their own accord. The only reliable way to stop them, it turns out, is to stop them forcefully. But the consequences of doing that are severe.



Maryvale, quite a way from Levittown

The limits to limits

GAVIN BARWELL, the member of parliament for Croydon Central, remembers when his district, on London’s southern edge, was regarded as much more salubrious than Brixton, 12km to the north. In 1981 riots in Brixton provided a blazing testament to London’s inner-city dysfunction and racial tension; now, still the cultural heart of Afro-Caribbean London, it is filled with gourmet coffee shops. Croydon, then seen as safe and staid—which in many parts it still is—has a far worse reputation. During the widespread riots of 2011, it burned hotter than anywhere else in the capital.

Croydon was a town in its own right until London engulfed it in the early 20th century. In the 1960s and 1970s local officials promoted it as a site for office towers, selling the suburb as a cheap back-office site for central London firms. The boom did not last. Those back-office jobs were soon being done even more cheaply elsewhere—by outfits like TCS, in suburban Chennai, among others. Almost half the offices in central Croydon are now empty. Many of its residential streets are distinctly dilapidated and increasingly disagreeable.

John Hickman, a retired scientist turned local historian, points to a row of large detached houses in South Norwood, a residential part of Croydon. They were once occupied by single families, he says—probably with servants. Now they have been chopped up into flats for the poor. The local high street is in a sorry state. Rubbish has been dumped in alleyways and next to a pedestrian underpass. Across the road from Mr Hickman’s house, a front garden is being used to store a bed. He locks the kitchen door when he leaves, so that any burglar who breaks in that way could only raid the refrigerator.

Croydon’s decline partly reflects the astonishing revival of inner London. A combination of improved public transport, a more liberal attitude to skyscrapers and the development of Canary Wharf—an office district on the site of the east London docks—has enabled businesses to cluster in the middle. Between 1997 and 2012 the share of Britain’s economic output supplied by firms in inner London rose from 12.3% to 15.6%. Inner London neighbourhoods have become cleaner and less criminal, too. Schools there are now better than schools in England as a whole.

Outer London has shared in only some of this joy. Its schools get good results, too—indeed they are slightly better than those in inner London. But it can scarcely compete with more central areas as a place to do business. Output per person in the outer boroughs was roughly average for Britain in 2000, but is now well below average. Croydon’s old office blocks are being converted into apartments for people who will commute to the city centre. And rising rents in inner London are pushing the poor out.

No American city has centralised to anything like the same degree. Measured by the total pay of its inhabitants, Manhattan grew only a shade more quickly than the state of New York has done over the past decade. The more suburban borough of Queens fared just as well as Manhattan, and Brooklyn did even better. Chicago and Los Angeles both account for a diminishing share of their states’ economies.

What makes London different? Part of the answer is its knowledge-driven economy, which favours dense clustering—the so-called “agglomeration effect”. The other part of the answer comes into view when you drive out of Croydon to the south. Leaving the office district, you travel through a ring of decades-old suburban houses and then, with no warning, enter a huge area of golf courses and farmland. This is the London green belt: a vast swathe, more than three times the area of London itself, in which it is almost impossible to build homes.

The London green belt came into existence in the 1930s and was strengthened by successive acts of Parliament. London was ▶▶

► then viewed as too large and sprawling too fast, rather like Chennai today. The green belt was the solution. It was popular—*The Economist*, which usually believes in freedom, nonetheless endorsed it—and it remains so. Green belts soon appeared around other British cities, then in other countries, where they are often called “urban growth boundaries”.

The example of London suggests that, given powerful restrictions on growth, a buoyant urban economy and excellent transport, cities can stop suburban sprawl. But they would impose great costs on many of their inhabitants in the process. Because of the green belt London has almost no modern suburban houses and very high property prices. A three-bedroom house even in rundown South Norwood costs around £300,000 (\$470,000), which would buy you an entire cul-de-sac in Maryvale. To provide desperately needed cheap housing, garages and sheds there are being converted into tiny houses; Mr Hickman calls them “shanty towns”.

The freezing of London’s suburbs has probably aided the revival of inner-London neighbourhoods like Brixton. It has also forced many people into undignified homes, widened the wealth gap between property owners and everyone else, and enriched rentiers. It has forced many commuters out of the city altogether: between 2001 and 2011 the number of people with a fixed workplace in London who lived outside the city rose from 724,000 to 795,000, or from 19% to 21% of the total. Many parts of England that look like self-contained towns actually function as dormitories. Their inhabitants appreciate the beauty of the green belt through the windows of crowded trains and traffic-jammed cars.

All these unfortunate side effects of the green belt stem from its all-or-nothing character. It is uncompromising—and suburbia, at its heart, is the embodiment of compromise. It is a space for solving puzzles involving cost, space and commuting time, of balancing the needs for work and recreations, privacy and community. Sometimes such solutions seem brutally simple; Americans talk of “driving until you qualify” on the basis that a home’s distance from the centre and its affordability—in terms of whether you can qualify for a mortgage that will cover it—are proportional to each other. In other times and places the trade-offs are more complex.

And they are also subject to change. As it becomes less necessary to travel to work each day, and easier to order food, clothing and other essential items online for home delivery, other considerations will weigh more heavily in people’s choice of neighbourhood. Crime, air quality, schools, churches, family, friendships, beauty—such things have always influenced where people live. But they will become more important, and suburbs will provide a variety of ways for people to make different compromises on their desiderata. An often-overlooked aspect of suburbia is variety, within reason; many cities (though not the largest) boast suburbs

as variegated as their central neighbourhoods.

A decade ago Edward Glaeser, an economist, explained that cities, which have long been recognised as efficient machines for production, are also good for consumption. He noted the rise of “consumer cities”, which draw residents more because of their wonderful amenities than because they put people close to jobs. San Francisco, from which many tech workers commute to suburban office parks, is a supreme example. Increasingly, the world will see consumer suburbs and consumer villages too.

Indeed, developers are beginning to build them. On the eastern edge of Mesa, a sprawling city of half a million souls next to Phoenix, a new 1,300 acre suburb called Eastmark is rising. The first few hundred families have already moved in to two-storey detached houses containing such modern perceived essentials as integral audio speakers throughout the house. Yet this suburb is not quite like the plantations of stucco boxes that sprouted a decade ago. To ensure that streets do not contain identical houses, the developer, DMB, has brought in a mix of builders. It insists that the fronts of homes do not precisely line up. And it is trying harder than most to create a society in the suburb. Houses are arranged around small parks to foster neighbourliness. Mailboxes are placed in those parks so people are obliged to congregate. A few miles away, DMB intends to build a new town centre.

Elsewhere in America, too, suburbs are being given a dab of urbanity. Mountain View in Silicon Valley—home of Google—is trying to create a modest downtown. The highly successful Research Triangle Park in North Carolina is to build a small urban core, with cafés and small offices intended to entice startups. In southern California, the developer Rick Caruso builds open-air shopping centres that emulate old-world city centres, only with musical fountains.

This sort of thing might strike urbanites as laughably ersatz. But they might consider how their own neighbourhoods have changed. The inhabitants of Greenwich Village in New York or Islington in London live in places much less densely populated than a few decades ago, and containing fewer poor people. Old cities, like suburbs, are increasingly oriented around shopping centres. Leeds city centre has been transformed by a new mall; so has Stratford, in London’s East End. Croydon’s officials hope that a Westfield shopping centre in their borough will do the same.

The pleasant character of many inner-city areas is partly a consequence of decades-ago sprawl. If the masses had been unable to move out of crowded urban districts, those places would never have become appealing to middle-class settlers. And, as suburbs come to seem more urban, the distinction between central cities and their suburbs is blurring. In time, the two may be almost impossible to tell apart—and the final victory of the compromising, humble suburb will be at hand. ■



Reasonably green, reasonably pleasant land

The
Economist

A new way to
print electronics

Civilian drones
take off

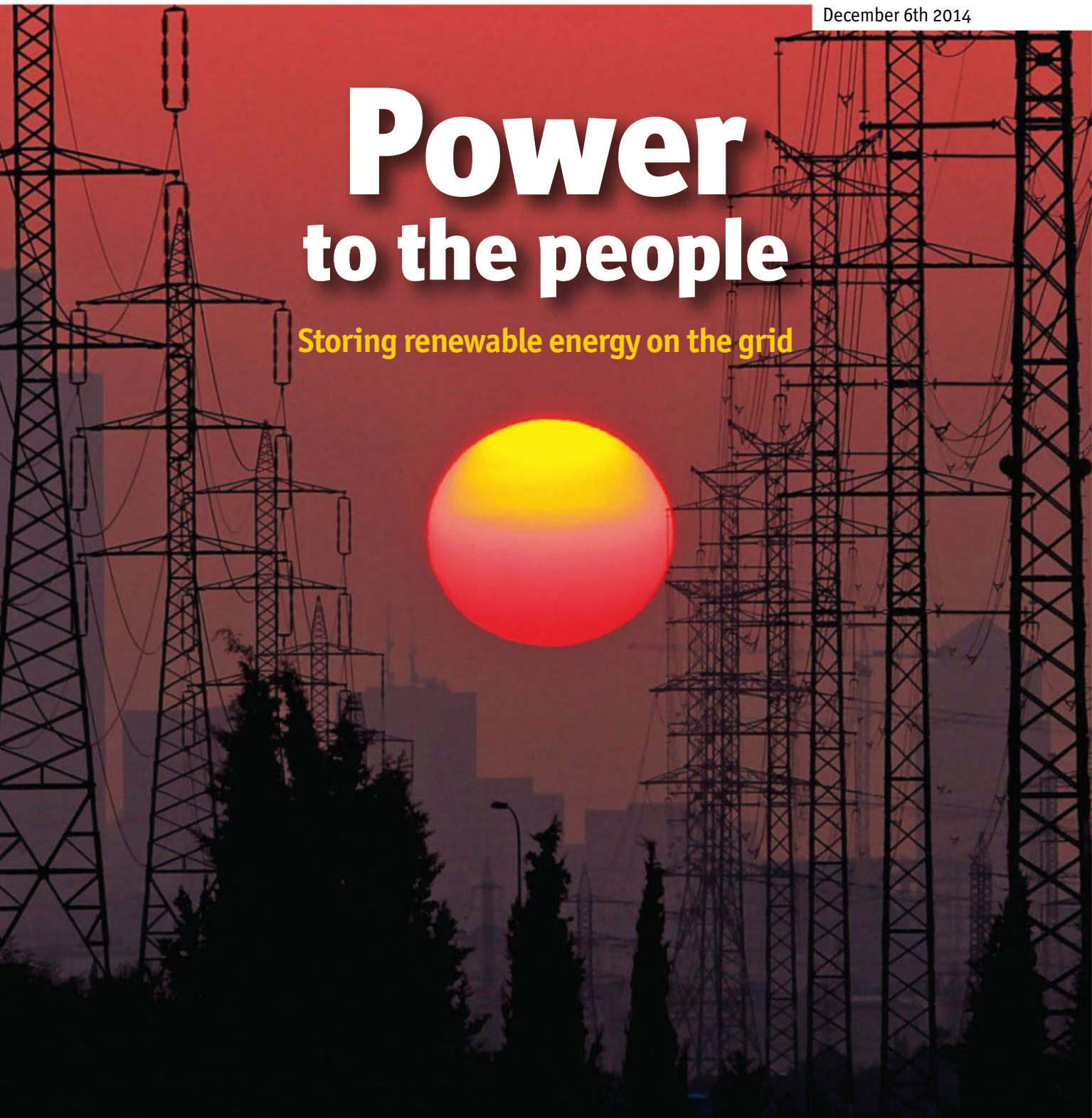
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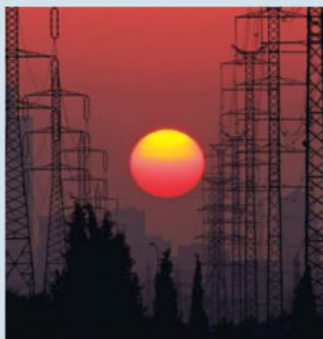
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Chips off the old block

Printing electronics: Borrowing from photocopier technology, researchers find a way to make an electronics printer

PRINTING has come a long way since Johannes Gutenberg perfected the commercial use of the printing press around 1439. Since then, movable type has given way to other processes, such as lithography and screen printing. In the digital era, laser and inkjet printers arrived. Then 3D printers emerged to make solid objects by building up layers of material. What would be nice is a machine that could also print the electronics that go into devices. Now one group of researchers has succeeded in demonstrating how just such a machine might work.

Although it is already possible to print layers of material to form some basic electronics, such as smart labels, these tend to be large and relatively unsophisticated compared with microchips made in a multi-billion-dollar fabrication plant. Some of Intel's latest chips, for instance, contain transistors as tiny as 14 nanometres (or billionths of a metre). Making things this small allows hundreds of thousands of components to be squeezed onto a single chip.

Typically in the electronics industry, chips are fabricated in batches on silicon wafers. The wafers are then cut up and the individual chips packaged as components which are mounted, often by robots, onto circuit boards. The circuit boards are then installed in devices. Instead of doing things that way, a team at the Palo Alto Research Center (PARC) in California

wondered about taking the individual chips as cut from the wafers and mixing them with a liquid to produce an electronic ink. The ink could then be used to print electronic devices directly.

Printing with "chips as ink" would provide two big benefits. The first is that the latest components from state-of-the-art fabrication plants could be used in the ink, which means high-performance devices could be printed. The second is that being a digital process driven by software, like 3D printing, an electronics printer would not rely on the economies of scale that rule most industrial processes. Just as each page of a document sent to a laser printer can be different at little or no additional cost, so too could the designs sent to an electronics printer. This is because software is easier to change than tools or production lines in a factory.

Electronic variety

All this means a single electronics printer could make lots of different things, cope with short production runs or knock out one-off prototypes without incurring a cost penalty. Such flexibility would be extremely valuable in product development and for specialist high-value, low-volume producers.

So much for theory. The practicalities are another matter. The big problem the team faced was to find a way to print tiny chips in the right places. To achieve this,



▶ they turned to an old idea: xerography. This is a technology used in photocopiers and was the basis for the creation of Xerox. It was made into a digital process when PARC, founded by Xerox in 1970 and now run as an independent research company, pioneered the laser printer.

Xerography relies on static electricity to position toner (a form of powdered ink) to form an image. A bright light is used to reflect a copy of a page onto a light-sensitive drum (or the image can be written onto the drum with a laser). An electrostatic field is generated in a way that makes toner particles selectively stick to certain areas on the drum to recreate the image. The image is then transferred to paper by rollers and fused with heat.

Toner particles only need to be in the right place, but chips must also be orientated correctly so they can be wired up. To achieve this, the researchers developed a way to induce a distinctive charge pattern on the surface of each chip. After being randomly spread on a surface, the chips are steered into their respective positions with an electrostatic field. They are then transferred to a final substrate with a roller. Depending on the application, they are wired up using photolithography or inkjet printing.

Ultimately, the intention of the PARC team is to have all these processes taking place inside a single machine. Just like a photocopier, people would then be able to use an electronics printer without having to know how it works.

From little acorns...

Such a machine is some way in the future. At their first attempt the researchers were able to print a device containing a grand total of just four microchips. It is not much to shout about, but it is enough to prove the concept of building an electronics printer that relies on xerography to construct functioning devices. The team is now working on printing devices with a greater number of chips and better accuracy. The researchers are also looking at possible applications which their process can be tried out on.

Janos Veres, who manages PARC's printed-electronics team, says roles could include printing devices, such as sensors, directly onto components. This is something the aerospace and automotive industries are exploring. Another possibility is printing large display screens.

And it is not just processors and memory chips which could be mixed into ink, adds Eugene Chow, who manages the research project. Different electronic inks, like coloured inks in a paper printer, could be made containing piezoelectric, optical and even micromechanical devices. "This is a radical new tool," says Dr Chow. "It has a long way to go but we think that it could have a huge impact." ■

Watery dwellings

Artificial reefs: New ways to construct underwater environments are encouraging marine life and boosting fish stocks

TOILETS, shopping carts, washing machines and other assorted junk have been dumped into the sea to create habitats for marine organisms and the fish that feed upon them. But making reefs from refuse is now frowned upon. Alabama, for example, banned fishermen from sinking vehicles in the Gulf of Mexico in 1996, even when drained of potentially harmful fluids. Now more bespoke artificial reefs are taking shape.

Reefs improvised from junk often do not work well. Corals struggle to colonise some metals, and cars and domestic appliances mostly disintegrate in less than a decade. Some organisms do not take to paints, enamels, plastics or rubber. Precious little sea life has attached itself to the 2m or so tyres sunk in the early 1970s to create a reef off Fort Lauderdale, Florida. Tyres occasionally break free, smash into coral on natural reefs and wash ashore.

Yet building artificial reefs that are attractive to marine life can pay dividends. Some of the reefs built in Japanese waters support a biomass of fish that is 20 times greater than similarly sized natural reefs, says Shinya Otake, a marine biologist at Fukui Prefectural University. He expects further gains from a decision by the Japanese government to build new reefs in

deep water where they will be bathed in nutrients carried in plankton-rich seawater welling up from below.

The potential bounty was confirmed in a recent study by Occidental College in Los Angeles. Over five to 15 years researchers surveyed marine life in the vicinity of 16 oil and gas rigs off the Californian coast. These were compared with seven natural rocky reefs. The researchers found that the weight of fish supported by each square metre of sea floor was 27 times higher for the rigs. Although much of this increase comes from the rigs providing fish with the equivalent of skyscraper-style living, it suggests that leaving some rigs in place when production ceases might benefit the environment.

Making reefs with hollow concrete modules has been especially successful. Called reef balls, these structures are pierced with holes and range in height up to 2.5 metres. The design is promoted by the Reef Ball Foundation, a non-profit organisation based in Athens, Georgia. Reef balls can be positioned to make the most of photosynthesis and for plankton to drift slowly across their curved inner surface. This improves the nourishment of plants and creatures setting up home within. A hole in the top reduces the chance of them being moved about by storm currents.

Concrete used to make a reef ball is mixed with microsilica, a silicon-dioxide powder, to strengthen the material and lower its acidity level to be more organism-friendly. The balls are cast from fibreglass moulds, which are typically sprayed with a sugary solution before the concrete is poured. This creates tiny hollows which provide a foothold for larval corals. Over 500,000 reef balls have been placed in the waters of more than 60 countries, and ▶▶



Taking up reef ball residence

▶ each one should last for some 500 years, says the foundation.

The value of artificial reefs has been boosted by the spread of GPS devices and sophisticated sonars on boats. This allows fishermen to locate the subsea structures precisely. It is necessary to be directly above the reef to reel in more fish, says David Walter of Walter Marine, an Alabama company that used to sink vehicles for fishermen but now places pyramid-shaped, hurricane-resistant steel, concrete and limestone structures to create artificial reefs. These constructions can cost nearly \$2,000, but many fishermen consider them to be a good investment, especially to catch red snapper.

Using underwater drones for long-term studies of reefs and their associated marine life is also helping improve designs. Sensors can be installed on reefs to monitor boat traffic and activities such as fishing and scuba diving.

An electric aquasphere

Perhaps the most innovative way to build a reef involves anchoring a frame made with steel reinforcing bars to the sea floor and zapping it continuously with electricity. This causes minerals dissolved in seawater to crystallise on the metal, thickening the structure by several centimetres a year. Biorock, as the resulting material has been trademarked, becomes stronger than concrete but costs less to make. More than 400 “electrified” reefs, many the size of a small garage, have been built this way. Three-quarters of them are in the ocean around Indonesia.

The electricity needed to power the Biorock can be supplied by cable. But it can also be generated at sea in various ways. A floating buoy can produce power from wave motion, or a raft can be tethered nearby fitted with solar panels or a small wind turbine. Only a dribble of electricity is needed, so marine life and people swimming in the area are not harmed, says Thomas Goreau, the boss of Global Coral Reef Alliance, a Massachusetts-based non-government agency which is behind the technology.

Artificial reefs are also used for other purposes, such as to improve surfing or to help prevent beach erosion. Less wattage than it takes to power a domestic air conditioner is presently being used to build a 50-metre reef designed to slow erosion along part of the coastline in the Maldives.

The electric current also stimulates coral growth. Once the mineral substrate has formed, divers use plastic cable-ties to attach bits of dying coral that have snapped off nearby reefs. Some pieces will recover their colour and start to grow again within an hour, says Mr Goreau. With a rapidly expanding world population, artificial reefs appear to be a promising way to improve fish catches. ■



Video in demand

Streaming media: As online video continues to boom, publishers are exploring new ways to deliver their content reliably

THE growth of video online is staggering. Almost 100 hours of it are uploaded to YouTube alone every minute. As more users watch video on an increasing number of mobile devices and internet-enabled televisions, the volume will grow ever larger. Cisco, a networking company, reckons nearly 1m minutes of video will cross the internet every second by 2018. Unfortunately, it can be a frustrating experience as many users find their playback keeps stopping and starting.

These delays, known as “buffering”, happen when data are loading. This is normal at the start of a film, but if it continues it may be due to other problems such as a home internet connection not being fast enough—especially when multiple users are online. But ffitful playback can also be caused by the networks that make up the internet being overloaded. Video gobbles up so much data that by 2018 it is likely to account for 80-90% of global consumer internet traffic.

Just as consumers can pay for faster connections, media firms can negotiate so-called peering agreements with internet-service providers (ISPs) to improve connections between their networks and speed up content delivery. Such deals have fuelled a complex debate about net

neutrality: the concept that all internet content should be delivered without preference or discrimination. While the debate rages, some big providers, such as Google (which owns YouTube) and Netflix, one of the world’s largest video-streaming services, are exploring other ways to deliver films more reliably.

Google has been perfecting a technique of pre-loading YouTube video clips for particular users before they even hit the play button. The choice is made by an algorithm which analyses users’ viewing histories and profiles. The selection is currently being cached in the memory of some mobile devices running the Android operating system, although YouTube intends to expand it to other devices soon.

At a deeper level, YouTube is fiddling with the protocols used for sending data. When a file is transmitted it is divided into packets of data which are then reassembled in the same order by the receiving device. Most web and video traffic is sent via “transmission control protocol” (TCP), one of the core protocols of the internet. TCP guarantees delivery of all the packets, but if any are lost in transit it stops the video to await their arrival. Most users, however, might prefer their film to keep playing even though there might be a temporary glitch in quality.

An alternative to TCP, called “user datagram protocol” (UDP), allows missing bits of data to be discarded and the show to go on. UDP is sometimes used for time-sensitive applications where dropped packets of data are not critical. YouTube has begun to serve large amounts of data to people using Google’s Chrome web browsers with a system Google has developed called QUIC, which stands for “quick UDP internet connections”.

More repeats

UDP might also be used by the big content-delivery networks (CDNs). A CDN functions like a repeater station, caching copies of popular video and audio files so that they are “closer” to users. Closer in internet terms means there are fewer time-consuming hops from one network to another. One of the largest CDNs, Massachusetts-based Akamai, says that a UDP-based protocol it is investigating has performed well.

Regardless of protocol, current methods for delivering video mostly still use a traditional A-to-B form of distribution. An alternative is peer-to-peer (P2P) networking, in which data are distributed by users to each other rather than being downloaded from a central source. Such networks were popularised by file-sharing services and, until recently, were used by Spotify to build up its huge music-streaming service. Spotify now intends to rely on centralised servers instead. This, says Babar Zafar, a Spotify product manager, is ▶

▶ because CDNs are becoming more important to deliver media to users reliably.

Nevertheless, some publishers are toying with P2P once again. Earlier this year Netflix advertised for a P2P engineer. A spokesperson for Netflix was coy about this, saying only that P2P is an “area of exploration” into alternative ways of distributing video.

Dailymotion, a French video site, is already experimenting with P2P. Martin Rogard, the firm’s chief operating officer, says one of his engineers has developed a novel peer-assisted form of CDN delivery. This involves video data being passed to CDNs by users while they watch. It means that CDN caches are better stocked and, because the process takes place via a web-based video player, there is no special software to be installed by users. Although promising, Mr Rogard stresses that the company does not yet have any plans to implement the technique.

There are other ideas. Bill Woodcock, executive director of Packet Clearing House, a non-profit research organisation, suggests that a technology called multicast could dramatically reduce the load on networks—especially for broadcasting live

events. Most online services today use a distinct data stream (unicast) for transmitting data to users. But when millions are watching the same stream, such as a World Cup football match, multicast would allow a single stream to be delivered over the ISP networks and then forked at the last step to the devices used by multiple recipients. But there would be costs in implementing the technology and it complicates the process of charging users for content.

Some researchers are looking at ways to rejig the internet itself to speed up delivery. One group, led by Peter Steenkiste of Carnegie Mellon University in Pittsburgh, has \$5m in funding from the National Science Foundation to help develop what is called the “eXpressive Internet Architecture”. The idea is that such a network would be able to route data through the internet’s least-congested points intelligently. For many users, having the fastest connection is for now the surest way to avoid the buffering blues. For those who must rely on slower connections, like the delays in their movies they may be in for a bit of a wait until some of the new technologies become more widespread. ■

Winfield of the University of the West of England, which along with the University of Bristol runs the robotics lab, compares the challenge to getting robots to swarm, but without the benefit of being able to program them to do so. Nanoparticles, after all, do not contain electronics and run on software as robots do.

To get robots to swarm three simple software rules are necessary: don’t get too close to another robot; return if too far away; and keep going forward. That, says Dr Winfield, will make robots swarm like midges on a summer’s evening.

Now follow me

A fourth rule, to go only in the same direction as your neighbour, will produce behaviour similar to that of a shoal of fish or a flock of birds. But it is a fifth rule that would make the swarm useful for bioengineers. This would instruct the robots to follow, say, a light source or magnetic field applied from outside the body. The robots would then move like worker ants in the direction of the beacon.

Dr Hauert says it is possible to program nanoparticles by changing their design. This might be their shape, size, coating, electrical charge or the materials they are made from. Ant-like trail formations have already been observed with some nanoparticles, adds Dr Hauert.

Tinkering with the design can lead to unpredictable behaviour. But Dr Hauert has a way to crowdsource potential designs and simulate the likely outcome. This is NanoDoc, which works like an online game. It allows bioengineers, and anyone else who would like to have a go, a chance to model nanoparticles.

As in most computer games, players need to earn their spurs and work through the first levels to become a master, or in this case a certified NanoDoc. Their reward is a real challenge: for example, designing a nanoparticle that can detect a rare event such as a sudden cancerous mutation. The best solutions are tested in the laboratory and, if successful, will be tried in animals and ultimately in human trials. Since its launch in September 2013, NanoDoc users have performed over 80,000 simulations.

Successful designs, however, can still run into problems: what happens if some of the nanoparticles in the swarm are damaged? Would they still be controllable or could they turn toxic? The researchers have a lot of work to do, especially in getting some form of communication going between nanoparticles.

Yet the research has already come far enough to persuade Dr Hauert that she could apply some of the lab’s simulation software to programming robots to swarm in the real world. That might be for tasks such as using legions of swarmbots to help clear up an oil spill or put out a wildfire. ■



Hunting as a pack

Nanomedicine: Tiny particles could be programmed to swarm together and mount a determined attack on cancer

WHEN Sabine Hauert told a recent RE.WORK technology summit in London about injecting trillions of man-made smart devices, some as small as 10 nanometres (billionths of a metre), into the human body and programming them to work as a pack to hunt down and kill tumour cells, it seemed to be a fantastical futuristic notion. But Dr Hauert knows her stuff and is starting to turn the idea into reality. She lectures at the Bristol Robotics Laboratory in Britain and has worked closely with Sangeeta Bhatia at the Massachusetts Institute of Technology, one of the pioneers of using miniaturised

biomedical tools to fight cancer.

What Dr Hauert is hoping to do with these nanoparticles is to give them the same kind of eerie collective intelligence that is displayed by swarms of birds, insects or fish. Some nanoparticles are already used to deliver drugs to a specific area of the body or to gather at the site of a tumour so that it can be identified more readily and destroyed by heat or radiation. And studies have suggested that if those nanoparticles could somehow communicate, move and act as one they could deliver 40 times as much medication.

One of Dr Hauert’s colleagues, Alan

A big bet on small

Nuclear fusion: An American company thinks it can have a commercial reactor ready and working within a decade

ONE of the clichés of nuclear-power research is that a commercial fusion reactor is only 30 years away, and always will be. Hence a flurry of interest—and not a little incredulity—when in October news emerged that Lockheed Martin, a big American engineering and defence company, has a new design for a fusion reactor that it believes could be up and running within a decade. A team at Lockheed's renowned Skunk Works, where its wilder (and often secret) ideas are developed, reckons fusion is ripe for a rethink.

Attempts to harness the types of reaction that power the sun and hydrogen bombs in order to generate electricity go back to the 1950s. The latest, a device called ITER, is under construction in France. Fusion is attractive in principle. It does not generate the same amount of nasty, long-lived radioactive waste that its cousin nuclear fission does. Its principal fuel is deuterium, an isotope of hydrogen that is found in water and is thus in limitless supply. And a fusion reactor would be incapable of having a meltdown. But it is hard in practice. Reactors like ITER, known as tokamaks, are huge and temperamental undertakings. Even when they work as prototypes, they do not look the stuff of commercial power generation.

A tokamak works by heating light

atoms (deuterium and a second hydrogen isotope called tritium) in a doughnut-shaped containment vessel, to the point where the atoms' electrons fly off and a soup of free electrons and naked atomic nuclei, called a plasma, results. This plasma is both confined within the vessel and heated by magnetic fields. Heat the confined plasma enough and the nuclei within it will merge when they hit each other, creating helium nuclei and free neutrons. The neutrons then carry further heat generated by this fusion reaction out of the plasma, and that heat can—in principle—be used to generate electricity.

As Tom McGuire, who is leading the Lockheed team, notes, however, the circular magnetic fields which coil around a tokamak's doughnut become unstable if the plasma's pressure is too high. Those instabilities permit the plasma to touch the reactor wall, at which point it cools and the whole thing shuts down. The plasma's pressure has therefore to be kept low, which reduces the rate at which nuclei encounter each other, and with it the rate of fusion. This means even the best tokamaks produce only about as much power as they consume.

Dr McGuire's compact reactor has a different field design. Its field actively strengthens as the plasma gets closer to the wall, meaning it can be maintained at much higher pressures. This makes the reactor more efficient and allows it to be much smaller for a given power output.

That matters. ITER, when it is finished, will weigh 23,000 tonnes and stand almost 30 metres (98 feet) tall. This is a giant undertaking, and yet another reason to doubt the tokamak approach's commercial viability. Dr McGuire, though, thinks his design could deliver a 100MW reactor (able to power 80,000 homes) of about 7 metres in diameter, weighing less than

1,000 tonnes. Indeed, smaller versions might fit on a large lorry.

Dr McGuire's design is, however, just that—a design. And therein lies the rub. Lockheed says it plans to have a working prototype running in five years and the first operational reactors in ten. For that to happen, Dr McGuire and his colleagues need the help of other fusion experts, which is why the firm has gone public. Nevertheless, though ten years is not 30, it is still quite a long time. Those who think commercial fusion really does have a future should not hold their breath. ■

How to judge a 'bot

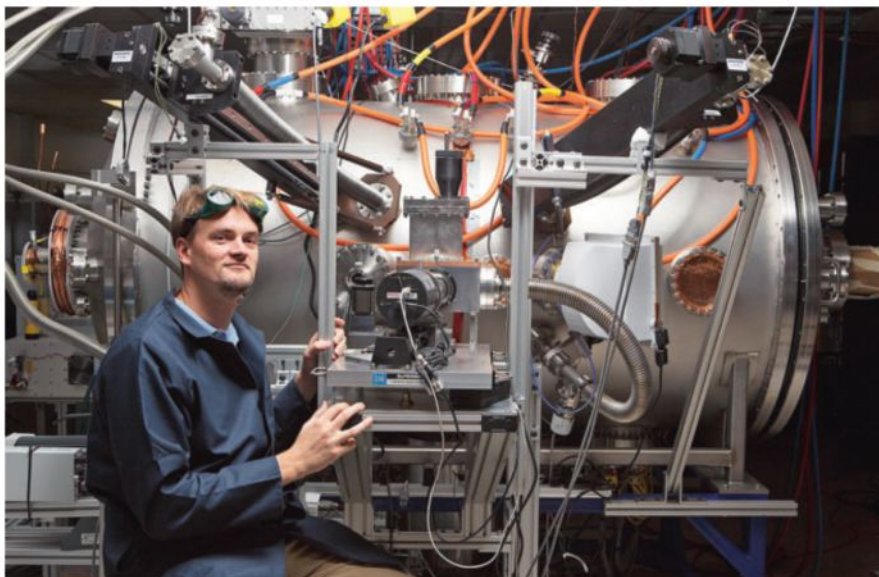
Robot jurisprudence: European policymakers look into making laws for automated machines and come up with some problems

WHEN the autonomous cars in Isaac Asimov's 1953 short story "Sally" encourage a robotic bus to dole out some rough justice to an unscrupulous businessman, it appears that the bus has contravened Asimov's first law of robotics, which states that "a robot may not injure a human being or, through inaction, allow a human being to come to harm".

Asimov's three laws are merely a bit of science fiction that is often taken to be a serious basis for robot governance. But robotic devices raise many thorny legal, ethical and regulatory questions. For instance, if an autonomous car is involved in an accident, who is to blame? And bionic technologies that enhance or become part of humans are trickier still. If an assistive exoskeleton is implicated in a death, who is at fault? If a brain-computer interface is used to communicate with someone in a vegetative state, are those messages legally binding?

It was questions such as these that led to the setting up in 2012 of a project called RoboLaw, largely funded by the European Union. Consisting of experts in areas such as law, engineering, philosophy, regulation and medicine, the group presented their report, called "Guidelines on Regulating Robotics", to a special session of the European Parliament in September. The report's recommendations are designed to help legislators successfully manage the introduction of new robotic and human-enhancement technologies into society without compromising principles already enshrined in European law.

The report's authors warn against "excessively restrictive" legislation that can stifle innovation. They recommend a ►►



Tom McGuire tries to make compact fusion

▶ “functional perspective” that concentrates on the practical use of robotics when drawing up any robot-specific laws. Broad, overarching legislation—such as Asimov’s three laws—is likely to fail, says Andrea Bertolini, of the Scuola Superiore Sant’Anna, in Pisa, Italy, which led the RoboLaw group. Instead, ad hoc legislation could be used to steer the development of the market in specific directions. That is an important suggestion when the term “robot” covers such a diversity of devices, from medical equipment to drones and vacuum cleaners.

Stringent product-safety rules, for example, might discourage development of advanced prostheses and exoskeletons, a set of technologies that the European Union is keen to support. Liability exemptions for manufacturers could relieve some pressure. “No-fault” plans, especially in cases where an insurance market for robotic devices is difficult to establish, could help too. Manufacturers and governments might pay into a compensation fund to be used if mishaps occur.

Prostheses also raise questions about the legal distinction between person and property, but the report suggests that there is no advantage to creating a new category between human and machine. As Dr Bertolini puts it: “A human with a prosthesis is still a human.”

Robot rights

But what about rights for the machines? Dr Bertolini says there are several arguments against granting them. Artificial intelligence is still far from surpassing that of humans. More philosophically, any autonomy that robots gain is designed and granted by humans. Thus, the argument goes, if robots are to be considered objects, not subjects, the question of rights disappears. But the report says that in limited circumstances robots might be granted a legal status similar to a corporation. This could allow them to perform some transactions, such as entering into contracts.

The authors believe that international bodies could play an important part in establishing standards and regulation. But robot law is not on many agendas. Ryan Calo, a law professor at the University of Washington, says that America lags behind both Europe and Asia in its attempts to tackle ethical, regulatory and legal issues in robotics. Mr Calo has called for the establishment of a Federal Robotics Commission to co-ordinate the piecemeal research going on in America. In the meantime, he says, the RoboLaw guidelines will be of some help.

Whether or not European legislators become the first to legislate on robotics, at least Asimov’s three laws can, respectfully, be laid to rest as the basis for serious legal discussion. The truth is stranger, and more complex, than fiction. ■

Uber for experiments

On-demand science: A startup enables researchers to tap labs worldwide to conduct experiments on their behalf

MOST research equipment is underused. Once it has been budgeted for, grant proposals written or fee schedules set to cover its purchase, kit costing millions of dollars can sit idle for most of the working day. This inefficiency troubled Elizabeth Iorns, a biologist from New Zealand. So she came up with the idea of a marketplace where laboratories could rent out their machines to conduct experiments for others.

Dr Iorns started Science Exchange in 2011 when working as an assistant professor at the University of Miami. She was backed by Y Combinator, a Silicon Valley firm that helps startups, and she now serves as the exchange’s chief executive.

Laboratories that carry out contract research have existed for a long time. But Science Exchange is exploring a new frontier, that of the shared economy, in which the best-known examples are Uber, an app-based ride-sharing and taxi service, and Airbnb, which helps people rent out rooms. The idea is that the market-maker shaves away the awkward bits relating to contractual, ad hoc relationships, often between parties who do not know each other, to create something

fungible or nearly so.

Dr Iorns is clear that certain laboratories are demonstrably better at some things than others. Her firm takes out contracts with some of the leading ones, including facilities at Johns Hopkins University, the Mayo Clinic and Harvard Medical School. It then provides ratings, reviews and other feedback, coupled with vetting, so that users can choose laboratories that can provide what they require and then compare pricing.

Unlike using a contract-research lab, which may involve lengthy negotiations and numerous visits to lawyers, Science Exchange gets each party to sign an agreement that governs all interactions and expectations for the work which will be carried out. This is especially valuable for startups as it saves time and money.

Ethan Perlstein, the founder of PerlsteinLab, has used both contract labs and Science Exchange. His San Francisco-based startup tries to find treatments for diseases that are too rare to attract the interest of big drugs firms. Many of these diseases are genetic. Although he intends to continue using contract labs for some of the company’s work, Dr Perlstein says the service negotiations involved “might add another month of lead time and another few thousand dollars of legal costs”.

In the first version of her exchange, Dr Iorns asked researchers to post their experimental needs and expected labs to reply with offers. This didn’t work. “Researchers are very private about the work they’re conducting,” she says. So the revised model gets labs to list their offerings. So far, this amounts to over 6,400 possible experiments. Researchers then obtain bids for the work they need or agree to posted fees. Science Exchange now has links to 1,000 labs and has handled \$43.6m in quotations, \$21.5m of that in the first nine months of 2014. The firm does not yet reveal the value of completed transactions, on which it levies a fee.

Each experiment may stand on its own. “It doesn’t require disclosure of the whole idea,” adds Dr Iorns, and participating labs make a legal commitment not to publish or to share any of the data they obtain. Having such work done by a third party can have advantages. It is harder for researchers to cherry-pick results unintentionally by shaping the process. There is also the benefit of having the work carried out by an experienced operator of the equipment concerned.

But some things researchers will want to keep in-house. As PerlsteinLab has grown it has begun buying a variety of equipment for “mission-critical work”. “There’s no way we’re going to outsource that,” says Dr Perlstein. Nor does he intend to rent his new gear out. But as some of it costs more than \$500,000, one day he might be tempted. ■





And the winners are...

Innovation awards: Our annual prizes recognise successful innovators in eight categories. Here are this year's winners

THIS newspaper was established in 1843 to take part in "a severe contest between intelligence, which presses forward, and an unworthy, timid ignorance obstructing our progress." One of the chief ways in which intelligence presses forward is through innovation, which is now recognised as one of the most important contributors to economic growth. Innovation, in turn, depends on the creative individuals who dream up new ideas and turn them into reality.

The Economist recognises these talented people through its annual Innovation awards, made in eight fields: bioscience, computing and telecommunications, energy and the environment, social and economic innovation, process and service innovation, consumer products, a flexible "no boundaries" category, and the corporate use of innovation. The awards were presented at a ceremony in Hong Kong on October 9th. And the winners are:

- **Bioscience:** **Jay Keasling**, professor of chemical engineering at the University of California, Berkeley, for developing synthetic artemisinin, the main ingredient in the treatment of malaria. Artemisinin is normally extracted from the sweet wormwood plant, but Dr Keasling reprogrammed microbes to make it.
- **Computing and telecommunications:** **Andrew Rubin**, former senior vice-president of Google, for the development of Android, the world's most widely used smartphone operating system. Based on a Linux kernel, Android was acquired by Google in 2005 and now powers 85% of smartphones sold each year.
- **Energy and the environment:** **Urs Hölzle**, senior vice-president of technical infrastructure at Google, for energy-effi-

cient data centres. The rows of servers that deliver internet services consume large amounts of electricity. Dr Hölzle's innovations have reduced energy consumption in Google's facilities to less than 50% of the industry average.

- **Social and economic innovation:** **Nandan Nilekani**, former chairman of the Unique Identification Authority of India, for the development of India's national identification scheme. A lack of formal identity documents excludes many Indians from the modern economy. Mr Nilekani led the project to create a national scheme based on biometric verification.

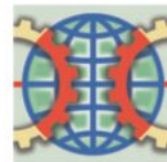
- **Process and service innovation:** **Perry Chen, Yancey Strickler and Charles Adler**, the founders of Kickstarter, for popularising crowdfunding. Kickstarter has let over 7m people fund 73,000 projects to the tune of more than \$1 billion.
- **Consumer:** **Renaud Laplanche**, founder and chief executive of Lending Club, for popularising peer-to-peer consumer lending. Intrigued by the fact that savings accounts pay very little interest, but credit cards charge high rates, Mr Laplanche set up a platform to match lenders and borrowers directly, giving both better rates.

- **No boundaries:** **Jack Dorsey, Biz Stone and Evan Williams**, the founders of Twitter, for pioneering microblogging using short messages, or "tweets". Twitter has 285m monthly users, who collectively send more than 500m tweets every day.

- **Corporate innovation:** **Pixar**. A pioneer in computer animation, Pixar makes both its own films (such as "Toy Story 3", pictured) and the tools used by other studios for animation and special effects. Pixar has earned 30 Academy Awards, including seven for best animated feature.

We extend our congratulations to our winners, and our thanks to the judges: Yet-Ming Chiang, professor of ceramics, Massachusetts Institute of Technology; George Craford, chief technology officer, Philips Lumileds; Hernando de Soto, president, Institute for Liberty and Democracy; Rodney Ferguson, managing director, Panorama Capital; Napoleone Ferrara, senior deputy director for basic science, University of California, San Diego; François Grey, manager, Citizen Cyberlab, University of Geneva; Robert Guest, United States editor, *The Economist*; Vic Hayes, senior research fellow, Delft University of Technology; Luke Ibbetson, head of R&D technology, Group R&D, Vodafone; Mo Ibrahim, founder, Mo Ibrahim Foundation; Salim Ismail, global ambassador, Singularity University; Jimmy Kim, general partner, SparkLabs Global Ventures; Susie Lonie, mobile payments consultant, sJL Consultant Services; Paul Markillie, innovation editor, *The Economist*; Raghunath Anant Mashelkar, president, Global Research Alliance, India; Yoichiro Matsumoto, professor and executive vice-president of engineering, University of Tokyo; Oliver Morton, senior briefings editor, *The Economist*; Andrew Odlyzko, professor of mathematics, University of Minnesota; Lesa B. Roe, deputy associate administrator, Langley Research Centre, NASA; Juliana Rotich, executive director, Ushahidi; Youssef Salah, deputy head, ICT sector, Biblioteca Alexandrina; Jerry Simmons, deputy director for semiconductor and optical sciences, Sandia National Laboratories; Kanwal Singh, senior managing director, Helion Ventures; Tom Standage, digital editor, *The Economist* (chairman); Ning Tao, chief operating officer, Innovation Works; Tuula Teeri, president, Aalto University; Vijay Vaitheeswaran, China business editor, *The Economist*; Hongyang Wang, director, National Centre for Liver Cancer, China Department of Health Science; Huanming Yang, director, Beijing Genomics Institute. The judging was run by John Eckhouse of Eventualities. ■

Wanted: a tinkerer's charter



Modifying devices: Users should be allowed to fiddle with the way consumer products work without suffering penalties from governments or sanctions from manufacturers

UNLOCKING a mobile phone is not called “jail breaking” for nothing. Using software to unlock a phone—so it can be used on a different cellular network after the initial contract with the wireless carrier expires—has been punishable in America by a fine of up to \$500,000 and/or five years in jail. Many have risked the penalties so they could use their phones on foreign networks while travelling abroad. Others have done so to get rid of all the annoying craplets installed by their carrier. And a few have “rooted” their phones to modify the way they work.

Thankfully, this prohibition has now ended. A year ago, a “We the People” petition on the White House’s website gathered 114,000 signatures for reform of the law—more than enough to send a wake-up call to lawmakers. In July Congress at last passed the Unlocking Consumer Choice and Wireless Competition Act, which Barack Obama signed it into law.

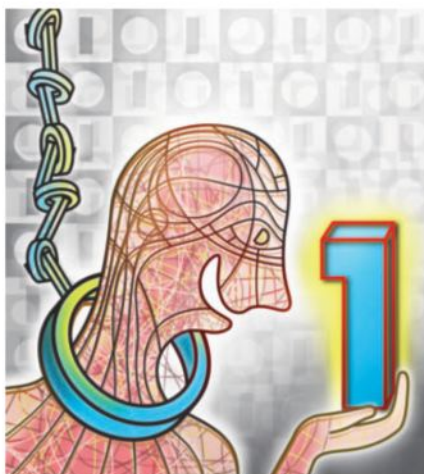
A victory, then, for common sense? Not entirely. Americans’ new freedom to unlock their phones could be quashed next year. The Library of Congress—the agency responsible for interpreting matters concerning copyright to the legislature—decides every three years whether to grant, renew or withdraw special copyright exemptions. The next review is in 2015. It is possible, but with luck unlikely, that this could lead to a challenge to the act.

It's my gear

Exactly why copyright law should be involved in something that ought to be a simple matter of consumer rights is hard to fathom. Any rational interpretation would suggest that when people buy or pay off the loan on a piece of equipment—whether a car, a refrigerator or a mobile phone—they own it, and should be free to do what they want with it. Least of all should they have to seek permission from the manufacturer or the government.

Yet the digital era has changed the notion of ownership. Buying a computer, for instance, confers ownership and the machine is covered by patents, trade secrets and design rights. But buying a computer program provides merely a licence to use the software. Ownership of the program remains with the person or company that created it. If copyright protection is considered to be more appropriate for software (although many disagree with that), then it is not unreasonable to think that any intellectual property embodied in hardware should certainly not be covered by copyright.

But it is not that simple. Back in the 1990s, following the introduction of audio compression algorithms like MP3 and file-sharing websites such as Napster, record companies faced an explosion in online piracy. Seeing it was their turn next, Hollywood studios lobbied Congress to prevent their films from being ripped off too. Meanwhile, internet-service providers and online companies—under the threat of being sued every time their services were used to share copyrighted music files or video clips—joined forces with the studios. The unhappy outcome was the Digital Millennium Copyright Act (DMCA) of 1998. To protect the online industry



from litigation, “safe harbour” provisions built into the DMCA allowed content owners to demand that any of their copyrighted material appearing on a website be taken down immediately. If an online company complied promptly, the threat of litigation was withdrawn.

To keep Hollywood happy, language was included in the act (section 1201) that made it illegal for anyone to “circumvent a technological measure that effectively controls access to a work protected under this title”. In other words, it was against the law to modify, repair or build tools to help circumvent the “digital rights management” (DRM) techniques used to encode DVDs and other digital media.

Most DRM systems lock individual copies of digital media to a specific user or machine. However, bypassing the laughable content-scrambling system (the copyright protection used on DVDs) is so trivial technically that it practically invites piracy. Free software tools like HandBrake, DVDFab and DVD Shrink can strip regional codes off DVDs and allow their contents to be transferred to hard drives or other storage media. The DMCA may have been a joke for pirate duplicating shops churning out illicit CDs and DVDs for the black market. But it was no laughing matter for people who had bought legitimate copies and merely wished to make backups, or to transfer one of their own disc’s content to a smartphone, tablet or iPod for their own convenience.

Unfortunately, the act’s drafters failed to appreciate the speed with which digital technology moves. For instance, the DMCA dates back to when DVDs were all the rage. But sales of DVDs have dwindled as people find it cheaper and easier to stream digital content from Netflix and the like. Yet the rules about circumvention survive to haunt the latest devices.

An even bigger mistake by the DMCA’s drafters was to define circumvention so broadly that it could be applied to practically anything containing a digital controller—a car, a washing machine or a combine harvester. Although it was never intended to cover mobile phones, wireless carriers embraced the DMCA as a way to lock customers into their networks. And they aggressively threatened websites offering to help people unlock their phones.

Companies in other industries have been quick to adopt similar anti-competitive practices—forcing customers, for instance, to buy supplies and maintenance support from them alone. How soon before only official dealers can service and repair people’s cars and appliances? Independent service shops already complain that manufacturers withhold diagnostic software and digital manuals needed to fix customers’ products.

The answer, according to Sina Khanifar, an entrepreneur and digital-rights activist who initiated the White House petition, is to rewrite the DMCA’s section 1201—to tighten the definition of what exactly it is that is illegal to circumvent. The issue Congress needs to decide is whether the DMCA’s circumvention provisions are, indeed, still needed now that the job they were designed to do—protect DVDs from piracy—no longer exists. ■



The robot overhead

Unmanned aircraft: After starting their career with the armed forces, drones are now entering civilian life—and creating concerns about safety

IT IS called an “airborne sidekick” by its Latvian manufacturer, Helico Aerospace Industries. But technically AirDog (pictured above) is a flying robot, or drone. The brightly coloured four-rotor quadcopter autonomously follows at a chosen altitude its master, who wears a wireless tracking device on his wrist. AirDog is designed to use its gyroscopically stabilised video camera to take action shots of skiers, bikers, kite surfers and other sporting activities. It is not the only “follow me” drone. IRIS+ (pictured on the next page), made by 3D Robotics, a Californian firm, can also follow a flight path mapped on a smartphone.

Ready-to-fly drones are now available from around \$1,000. Some have been developed from radio-controlled model aeroplanes. But their ability at low cost to operate autonomously comes from the use of commodity electronics developed for consumer gadgets. Mobile phones, for instance, contain a number of devices useful in making drones, such as gyroscopes, accelerometers, wireless transmitters, signal processors and GPS units. As a result the use of drones is spreading rapidly beyond their now familiar military roles. Civilian drones are being used by businesses rang-

ing from surveyors to utilities, delivery firms, news organisations and farms.

Businesses can save a lot of money with drones. Dillon Consulting, a Canadian company, hired one for about \$7,000 to survey a landfill site in Ontario. It reckons chartering a manned aeroplane or helicopter would have cost at least three times as much. GeoGIS Consultants, a firm in Belgrade, Serbia, maps landscapes with lasers and other sensors for road and rail construction. It bought a drone two years ago for around \$31,000 and stopped using manned aircraft. The drone’s cost was recovered in just two months, says Tosa Ninikov, the company’s owner.

Cancel the helicopter

Drones can improve safety, adds Dillon’s John Fairs. They are increasingly used to inspect wind turbines for cracks instead of workers kitted out with climbing gear. Drones are also being operated for power-line inspections. As this can involve lowering from a helicopter engineers clad in insulating suits and safety harnesses to crawl along a pair of high-voltage cables strung shoulder-width apart, it can be a “recipe for disaster”, adds Mr Fairs.

Data collected by drone are often more accurate than information gathered by other means. Fitted with two cameras for stereo vision, a drone called AeroHawk can map the dimensions and contours of a road at a resolution of about 2cm, says Scott McTavish, boss of a British Columbian firm called Accuas that surveys infrastructure. The best a commercial satellite can offer is about 30cm, but it could take more than four months to book one and might cost at least \$10,000, adds Mr McTavish. The aircraft-like AeroHawk does not need a runway. It is tossed into the air and recovered by parachute.

Eight months ago Jean-Baptiste Bruggeman began flying a drone over his 210 hectares of farmland in La Louptière-Thénard, France. The robot’s multiple lenses photograph his fields from nine angles in infrared, near infrared and visible wavelengths. After the data are uploaded to a server, agronomists at Airinov, a Paris company, analyse details such as the level of moisture in the topsoil, the chlorophyll content of the crop and its biomass. Within 48 hours Mr Bruggeman receives an electronic map with encoded instructions. When uploaded to his GPS-equipped tractor, it automatically adjusts the spread of fertiliser to the optimal amount required for every part of his fields.

The benefits are enormous. Improving fertiliser allocation boosts yields enough to earn Mr Bruggeman, per hectare, an extra €50 (\$64) for rapeseed and up to €100 more for wheat. The wheat’s protein content is also higher. As less fertiliser is applied, polluting run-off into streams is reduced. Mr Bruggeman is now starting a ►►

Agriculture will be the biggest beneficiary of drones. Japanese farmers have used drones to boost yields by about 15%

►sideline to fly his drone for other farmers. Airinov already analyses drone data for more than 2,000 French farmers, and expects that to become 5,000 within a year.

Besides surveying, drones can seed and spray fields without compacting topsoil or crushing plants. Large helicopter drones, such as Yamaha's petrol-powered RMAX, fly lower than manned crop-dusting aeroplanes, so less pesticide is carried off by the wind. Rotor wash from the drone produces a finer mist and shakes leaves to help cover their underside with spray. By one reckoning, this cuts in half the amount of liquid that would otherwise be sprayed by tractor. The RMAX is widely used in Australia, Japan and South Korea. It is transported to fields in the back of a pickup truck, but costs a princely \$125,000.

Bug hunting

Two years ago an insect-borne citrus disease called huanglongbing began ruining fruit and killing trees in southern California. Infected trees, which need to be cut down and removed quickly to prevent the disease from spreading, show a slight increase in temperature. This can be spotted by a drone carrying a heat-detecting camera which operates across a range of wavelengths and costs less than \$5,000, says Sindhuja Sankaran, a biologist at Washington State University.

Temperature rises are typical in many diseased, parched or nutritionally deficient crops. So drones could have a wider role in keeping crops healthy. The Association for Unmanned Vehicle Systems International (AUVSI) believes agriculture will be the biggest beneficiary of drones. Japanese farmers have used drones to boost yields by about 15%, the industry group says. It reckons the commercial benefits from drones for the American economy are worth more than \$10 billion a year.

But there is a problem in America. Flying small drones as a leisure pursuit is allowed under Federal Aviation Administration (FAA) guidelines used for model aircraft, which include staying below 120 metres, away from populated areas and having the craft in view at all times. But flying a drone for commercial purposes is largely banned and waivers are rare. It is not just farmers and surveyors who are affected, but also the film industry, which is keen to use them for action shots. Lawmakers, frustrated to see some American firms move their drone operations to Canada, Mexico and other countries where regulations are less restrictive, have ordered the FAA to come up with a set of rules by Sep-

tember 30th 2015 that will allow the flying of drones for commercial purposes.

If the rules are reasonable more than 70,000 jobs could be created within three years, says Mario Mairena, head of government relations for AUVSI. But many drone advocates are gloomy and fear that the FAA is using safety concerns to protect pilots' jobs. There has been some heavy-handed action. An FAA policy statement in June forced dozens of universities to cancel engineering lessons that involved flying robots over campus lawns. The policy redefines the aircraft the FAA can ground so broadly it could include frisbees, laments Paul Voss, an aeronautics professor at Smith College in Massachusetts.

The FAA even fined a man \$10,000 for flying a small styrofoam drone around a Virginia campus for a promotional video. (A judge overruled the fine but the agency has appealed.) The FAA rejects criticism of "regulatory overreach". The agency maintains that it is required to protect people and property from injury, and that it has a duty to ensure drones do not interfere with manned aviation.

There is concern that the rules for civilian drones could be onerous. Brendan Schulman of Kramer Levin Naftalis & Frankel, a New York law firm, says that the FAA looks set to require even small drones to undergo a costly certification process—much like manned aircraft. He reckons regulators will allow daylight flights only with two licensed operators—who, like commercial airline pilots, must be medi-



cally approved—standing on the ground and keeping the drone in sight at all times.

Aviation authorities in other countries are also working on rules, but many seem more relaxed, provided basic safety procedures are followed.

Some people in America are not waiting for the FAA. Robert Blair of Kendrick, Idaho, uses a drone made from an \$85 model aircraft to monitor his farm's 607 hectares. It allows him quickly to spot diseases like wheat rust and with timely action can cut pesticide use by two-thirds. He says it is frustrating that agricultural drones are legally flown in Argentina, Australia, Canada and elsewhere. More American farmers now flout the FAA's ban, he says, than the agency has resources to catch.

Nevertheless, there are risks. In February photojournalists at El Salvador's biggest daily, *La Prensa Gráfica*, began taking pictures and video with three Phantom 2 Vision+ quadcopters. Each cost roughly \$1,500 to import from DJI Innovations, a rapidly growing Chinese firm. Their aerial imagery boosted website clicks and embarrassed politicians who pledged to ease traffic gridlock only to see bird's-eye shots of snarled-up roads. In April, however, one of *La Prensa Gráfica*'s drones nearly struck a power line and fell into a crowd attending a parade. Luckily no one was injured.

Operators are trying to improve safety. Drones often connect to a number of GPS satellites, so records of their flight paths are usually precise. 3D Robotics has put online a test version of a database to which the co- ►►



DHL's parcelcopter leaves for work

ordinates of flights will be uploaded from dozens of manufacturers' drones. Unmanned aircraft synchronised to the system, called DroneShare, can then be instructed to follow routes that have already been safely navigated and avoid danger spots (a flagpole, say).

Prudence is in order, says Sean Cassidy, head of safety for the Air Line Pilots Association, International. He points to the US Airways plane that ditched safely on the Hudson River in New York in 2009 after its engines ingested geese, which are the size of some small drones. Software can help prevent that by automatically reining in drones if they venture too far or too high, says Josh Brookes-Allen, founder of Alphaflight Aerospace, an operator of cinematography drones in Sydney, Australia.

NASA, America's space agency, is building an air-traffic-control system for drones. Operators will log on to a website and reserve blocks of airspace for flights. An early version of the system is expected online shortly. Flights will be forbidden near airports and capped at an altitude of about 120 metres. That leaves enough airspace for what Accenture, a consultancy, considers to be the most complex mission for civilian drones—automated delivery.

Amazon says that a drone-delivery service called Prime Air that it has tested in Canada will be ready by early 2015, assuming the FAA ban is lifted. Following recent testing in Australia, Google has also determined that deliveries with self-flying vehicles are practical, says Phil Swinsburg of Unmanned Systems Australia, a firm working on Project Wing, as the Google drone effort is known.

DHL, a logistics giant based in Germany, has already begun to deliver medicine by a "parcelcopter" drone (pictured on previous page) to Juist, a small island in the North Sea. An Australian startup called Flirtey expects to begin delivering books with six-rotor hexacopters before the end of the year. Delivery will cost more than sending the books in a van, at least initially. But it will be faster—Flirtey's drones fly about 80km per hour (50mph) and pay no heed to traffic lights. Parcels are lowered from above to recipients. Matt Sweeny, the firm's chief executive, is also talking to fast-food chains about drone delivery.

Even in an all-terrain vehicle, a 150km slog on muddy roads in Papua New Guinea can take a day. With tuberculosis spreading, Médecins Sans Frontières, a French charity, would rather airlift saliva samples by drone from jungle collection centres to diagnostic labs. Matternet, a Sili-



An AeroHawk in launch mode

con Valley firm hired to design the system, is working out a way to prevent the loss of a \$5,000 drone in a distant treetop. Although guided by GPS, the drones relay flight data to their base through transmission towers for mobile phones. A drone struggling in a headwind can therefore be called back before its battery peters out.

Pallets of cargo could be hauled with big drones the size of some manned aircraft. With no on-board pilot or crew, the aircraft would hold more and weigh less. Simply building an aircraft with thinner walls for unpressurised flight reduces its weight by a tenth, says Hans Heerkens of Twente University in the Netherlands. He leads Platform Unmanned Cargo Aircraft, a group of more than 30 university and industry experts working on the concept.

Filing a flight plan

If drones are to fly in the same airspace used by manned aircraft, more collision-avoidance technology is needed. Passenger aircraft carry transponders that relay their position to ground radar. But an aircraft-type transponder would be too heavy for many small drones to carry, and with plastic or styrofoam airframes they might not be detected with radar.

Some drone developers propose using cameras with object-recognition processors to prevent collisions. But cameras cannot see through clouds and could be confused by a bug splat on the lens, says Mykel Kochenderfer, an aeronautics expert at Stanford University.

A more promising approach is offered by small on-board GPS-based devices that are part of a system called Automatic Dependent Surveillance-Broadcast (ADS-B). These devices repeatedly broadcast not

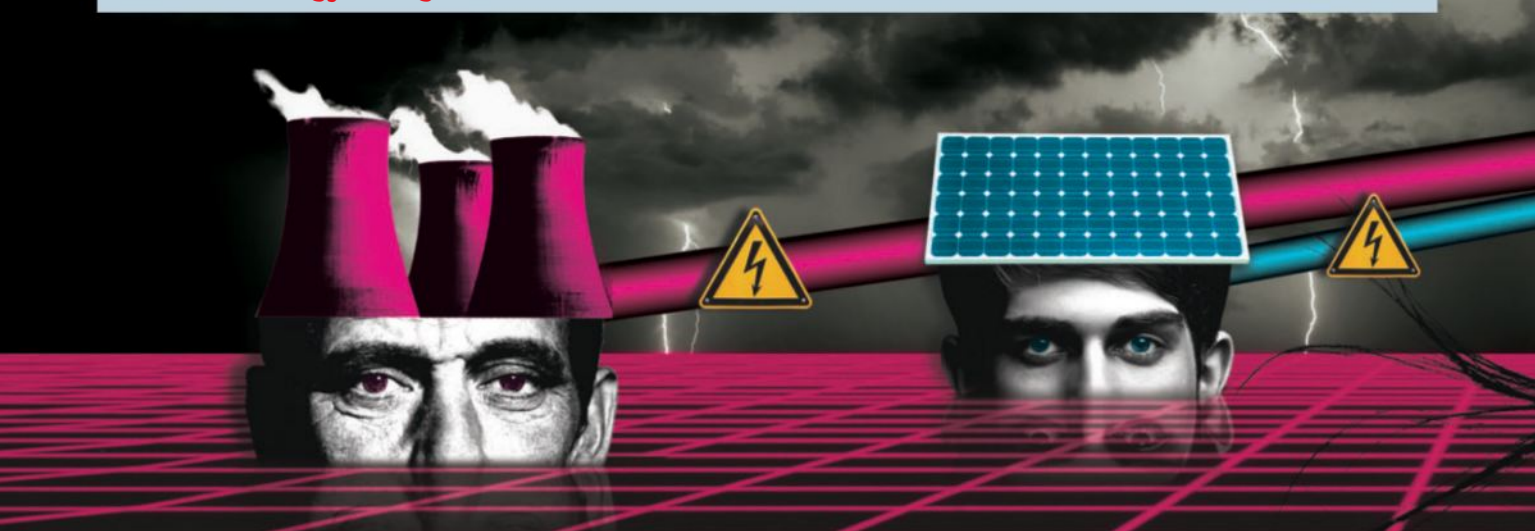
just the aircraft's position but other data, including its flight path. They also receive similar co-ordinates from any nearby aircraft. ADS-B is part of a new generation of air-traffic management being installed in America, Europe and elsewhere.

The ADS-B devices are light enough to be carried by many drones and more than 1,000 already have them, says Kelvin Scribner, boss of Sagetech, a firm in Washington state that sells an ADS-B device weighing a shade less than an iPhone. Even smaller versions are said to be on the way. ADS-B technology could be used to automate the management of both manned aircraft and drones flying in the same area of sky. Eventually it will form the backbone of drone safety, reckons Benjamin Trapnell, head of the University of North Dakota's aviation department.

One problem is that GPS signals might be jammed, deliberately or inadvertently. Illegal jammers the size of a cigarette pack are widely sold for about \$25 in eastern Europe to truck drivers disinclined to be tracked by their boss, says James Scanlan of the University of Southampton in Britain. His team are designing directional GPS antennae which are unlikely to be muddled by such interference. If a problem were to arise, he says, on-board gyroscopes and accelerometers would be able to work out a drone's approximate position.

Yet risks go beyond accidents. It would not be difficult to rig a drone with a weapon or small bomb, so terrorism needs to be guarded against. And there may be no fool-proof way to prevent a drone from being wirelessly hijacked, says Gerald Dillingham, a former member of America's 9/11 Commission. "Spoofing", as this is called, is possible because GPS signals are typically unencrypted, adds Mr Dillingham, now head of aviation for the Government Accountability Office, a watchdog agency of America's Congress.

Drones also give paparazzi and activists new scope. Last year People for the Ethical Treatment of Animals launched a programme called "Air Angels" in America using drones to record people hunting animals in cruel or illegal ways. Describing anti-hunting activists' drones as "rude, invasive, annoying, distracting", Cindy Neel, manager of the Wing Pointe reserve in Pennsylvania, says customers on a pigeon shoot blasted one activist's drone out of the sky. The commercial lure of drones is a powerful incentive for a new industry to get airborne, but without sensible safety and other procedures there will be stormy skies ahead to navigate. ■



Smooth operators

ON OCTOBER 28th a battery factory opened in Concord, North Carolina. That was good for an area which has seen dark economic times, but the event made few headlines. Perhaps it should have made more, though, for this factory's owner, Alevo, a Swiss company, is not in the business of manufacturing cells for torches, mobile phones or even laptop computers. Rather, it is making batteries that can store serious amounts of electricity—megawatt-hours of it. And it plans to sell them to power-grid operators.

To start with, the new batteries will be used to smooth the consequences of irregular demand through the day by absorbing electricity during troughs and regurgitating it during peaks. If that pans out, it will eliminate the need for gas-powered “peaker” stations which fire up quickly when needed, but are expensive to run. It would also allow non-peaker stations to operate more efficiently. Alevo reckons that if a grid as big as America's Western interconnection (which supplies the west of the United States and Canada) were to use 18GW-worth of its batteries the grid could save \$12 billion a year. Though the company has no North American contract yet, it does have an agreement to deploy its batteries in Guangdong, China.

Smoothing the operation of existing grids, however, may be only the beginning. In the longer run, optimists believe, batteries like these, or some equivalent technology, are the key to dealing with the problem not just of irregular demand, but of irregular supply. As the unit cost of solar and wind energy drops ever closer to that of power from fossil fuels, the fact that the wind does not always blow and the sun does not always shine becomes more and

Electricity grids: Matching output to demand is hard with wind and solar power. The answer is to store surplus juice on the grid until it is needed

more irksome. It is not just the great power-gap that is night which matters. As the chart below shows, even during the day—and even in deserts—the amount of sunlight can vary from minute to minute. And the wind, of course, is equally fickle.

Cheap grid-scale storage would overcome these irregularities. Renewables could then compete on cost alone. And there are many ideas for how to make this happen. Some, such as Alevo's, are ready to be sold. Others work in laboratories but have yet to be scaled up for use in the real world. Others still are little more than twinkles of varying plausibility in their inventors' eyes. But if even one of them is up to the task, then renewable energy may, at last, be able to stand on its own, rather than having to be subsidised and regulated into existence.

At the moment, grid-scale storage is dominated by pumped hydro. According to the Electric Power Research Institute, an American think-tank, 140GW-worth of

this is installed around the world, with a capacity of 1.4TWhr. Pumped storage requires friendly geography. You need two reservoirs separated by a good gap of altitude. But it is then just a matter of linking them with pipes and using turbines that, if turned by falling water, generate electricity, but, when fed electricity, turn the other way to pump that water whence it came. Send it uphill when power is cheap, and let it flow down when there are spikes in demand, and you have a nice little business.

Not everywhere, though, has compliant hills and valleys. And pumped storage takes a long time, and a lot of money, to build. Technologies that start small, but can be scaled up as needed, are often a better answer.

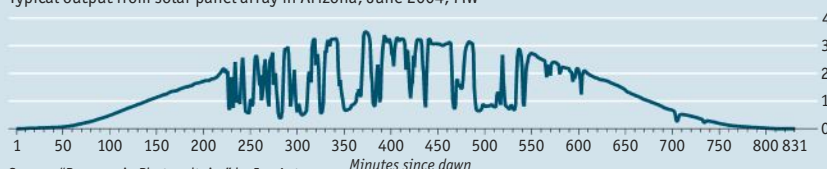
Batteries now included

The immediate future of grid-scale storage, then, probably lies with real batteries rather than topographical ones. At least, Alevo thinks so. At full capacity, the firm's factory in Concord should be able to turn out 16.2GWhr-worth of them a year. And Alevo is not alone. Tesla is building an even bigger factory near Reno, Nevada (see page 19) to make batteries for its electric cars and for local and grid storage.

Several stations that use batteries to regulate the output of wind farms have already been built, or are under construction. In Sendai, Japan, Toshiba is creating one based on lithium-ion batteries. This should open in 2015. It will have a maximum power of 40MW, and will be able to run at that rate for half an hour. The No- ▶▶

Bright spots

Typical output from solar panel array in Arizona, June 2004, MW



Source: "Progress in Photovoltaics" by Jay Apt



► trees Battery Storage Project, which opened in Texas in 2013, uses lead-acid batteries—sophisticated versions of the type found in petrol and diesel cars. It has a maximum power of 36MW and could run for 40 minutes at full tilt. Another Japanese project, of 34MW, in Rokkasho, uses sodium-sulphur batteries. And one in Alaska, of 27MW, uses nickel-cadmium ones.

As that list suggests, many types of grid-scale battery technology are available. Alevo uses electrodes made of lithium iron phosphate and graphite. These are connected by an inorganic sulphur-based electrolyte, a combination, the firm claims, that is particularly propitious because cycling between charged and discharged states produces only a 1°C change in the battery's temperature. This should eliminate the risk of overheating, to which some sorts of lithium-based cells are prone.

There are types of battery that actually require high temperatures to work. In sodium-sulphur cells of the sort deployed at Rokkasho both of those elements need to be liquid, meaning the battery has to be maintained at a temperature of 300-350°C. And an approach being developed by Donald Sadoway of the Massachusetts Institute of Technology would use two sorts of liquid metal, separated by a liquid electrolyte. The clever thing about this design is that, by picking a dense metal such as a mixture of antimony and lead, a light one such as lithium, and an electrolyte whose density falls between the two, the three substances will float as separate layers in a container, rather as oil separates from vinegar in a salad dressing.

Despite their superficial differences, one thing all these batteries have in common is that the energy they contain is stored chemically within their electrodes. This has a consequence, at least for those with solid electrodes. The constant change in the electrodes' composition as they are charged and discharged gradually wears them out. This limited lifespan is one reason using batteries for grid-scale storage is

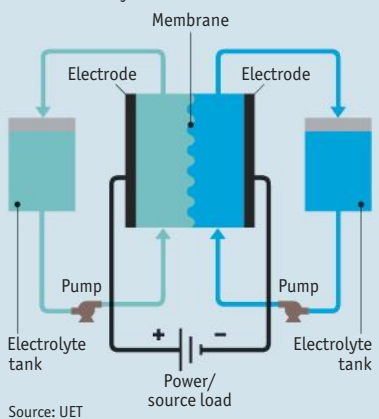
still pricey. Indeed, Alevo's claim that its batteries can undergo more than 40,000 cycles of charging and discharging without noticeable loss of function is an important part of its sales pitch.

An alternative approach, known as a flow battery, does not suffer from this difficulty. A flow battery's energy is stored in its electrolytes (of which there are two, separated by a membrane), rather than its electrodes (see illustration 1). Not only does that stop the electrodes wearing out, it also means that there is no upper limit, based on the sizes of those electrodes, on how much energy such a battery can store. Its capacity depends instead on the size of the tanks used to hold the electrolytes.

Flow batteries are a much less developed technology than standard batteries, but they are beginning to become commercially available. Many of those on sale at the moment (by firms such as Gildemeister of Germany and UET of Washington state) use vanadium-based electrolytes. Vanadium is a good material because its multiple ionic states mean it can be used to store energy without having to involve other reagents, and thus complicate the design.

Going with the flow

Schematic illustration of the structure of a flow battery



Unfortunately, vanadium is expensive.

But systems that use cheaper materials are being developed. Several firms are trying zinc and bromine in electrolytes and others iron and chromium. Ideas still in the lab include flow batteries based on cheap organic compounds called anthraquinones. If these prove robust enough to commercialise, they will be strong competitors in the grid-scale storage market. But they will not be alone. For batteries are not the only route to the destination.

Pumped up

If the engineers at Gravity Power in Goleta, California, get their way, even pumped storage is in line for a makeover. Their approach, it should be said from the outset, is one of the most twinkly of the twinkling eyes in the field. Even if it ultimately fails it shows the originality of thought that is being brought to bear on the problem.

Instead of two large reservoirs at different altitudes on a hillside, Gravity Power proposes two water-filled cylindrical shafts—one wider than the other—dug into the ground (see illustration 2 on next page). The shafts will be linked top and bottom to form a circuit, with a combined pump-turbine, similar to the ones used in conventional pumped storage, in the upper link. The wider shaft will contain a huge cylinder, made either of the rock the shaft is cut through or of concrete, to act as a piston.

When the pump-turbine is opened, the piston sinks, driving water around the circuit and through the turbine, generating power. Spin the device the other way using electricity, and the reversed water flow pushes the piston up again.

How much energy this arrangement can store depends on how deep the shafts go. And that is where it gets tricky, for some serious civil engineering will be needed if the idea is to work. Gravity Power proposes the shafts descend hundreds of metres. This will require large thicknesses of suitable rock—in practice this will probably be limestone, which is soft enough to cut ►►

The world would no doubt be a better place if the externalities imposed by fossil fuels were properly accounted for in the price of electricity

► into—so deployment will be limited not so much by geography as geology. And making a good seal between piston and shaft will hardly be trivial. So it will be expensive. A unit 700 metres deep, with a main shaft 26 metres across and a return shaft (or penstock) of about a tenth of that, would cost \$170m. It would, though, be able to store about 200MWhr of energy, with an output of 50MW. Building one that size is years away, but the firm hopes to start work in 2015 on a demonstration plant near Penzberg, in Germany, with a depth of 140 metres, a capacity of 500 kwhr and an output of 1MW.

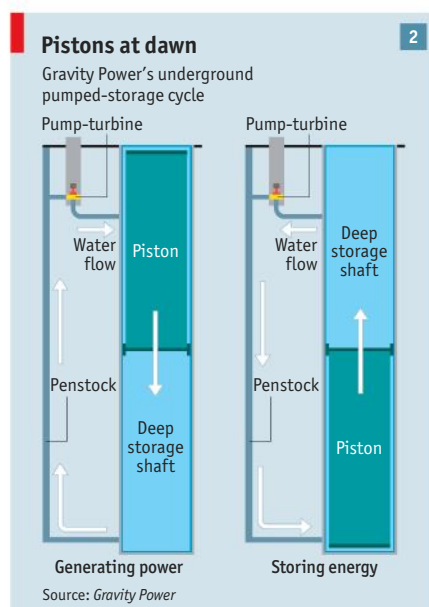
Nor is Gravity Power's approach the only one to rely on underground spaces and friendly geology. Another is to fill a subterranean cavern with compressed air. For that, the cavern needs to be hermetically sealed and this means using an underground salt dome that has been hollowed out by solution mining (ie, the salt has been extracted with hot water).

Given such a cavern, compressed-air storage is a bit like classical pumped storage, except with a gas, rather than a liquid. Air is pumped into the cavern, increasing its pressure, and then let out to drive a turbine. But there is a catch: gases heat up when compressed and cool when they expand. For compressed-air storage to work, therefore, the air released from the cavern has to be heated (usually by burning natural gas), otherwise it would freeze the turbine. That makes compressed-air storage inefficient—one reason there are only two grid-scale examples of it in the world (one in Germany, the other in Alabama).

This would change if the heat of compression could be captured, stored and recycled. And that is the goal of LightSail Energy, a firm based in Berkeley, California. LightSail has developed a small, but still grid-scale, compressed-air system that sprays water into the compression chamber, to cool the air as its volume shrinks. The air is then stored in a set of tanks with a total volume of 42,000 litres, and the water, with its heat load, is put into two tanks that have, in total, about a quarter of the volume of the air tanks.

At the moment, this device can store 700kwhr of energy, but that should rise to 1.1MWhr when (as is the plan) it is pressurised to 300 atmospheres instead of the current 200. That is a fraction more than one of Alevo's battery packs, which store 1MWhr. For comparison, the Alabama salt dome can store 2.9GWhr.

If heat is to be stored at scale some inventors would prefer to simplify the pro-



cess, get rid of the compressed air, and concentrate on sequestering the heat itself. Isentropic, a company in Fareham, Britain, plans to employ the compression and expansion of a gas (in this case, argon) to create heat and cold respectively in two large containers of gravel—one of the cheapest solid heat-storage media imaginable. Once again, a pump-turbine is involved. It does the compression and expansion when electricity is abundant, and when it is scarce the gas flow, and thus the heat flow and therefore the whole process, is reversed.

Nor are these ideas the end of the list. Several firms, from giants such as ABB of Zurich, to minnows such as Berkeley Energy Sciences, a neighbour of LightSail, are pushing giant flywheels as at least part of the answer. Another suggestion—for filling in the shortest irregularities in supply, those lasting a few seconds or minutes such as are caused by the passage of a cloud in front of the sun—is to use supercapacitors, which store electricity as an actual electric charge, rather than converting it into chemical or physical potential energy of a non-electric form. At the other end of the scale as far as the size of the gap in supply is concerned, namely the nocturnal hours when solar energy cannot operate, several research groups are trying to use molten salts (usually sodium and potassium nitrates) to store heat gathered during the day and then, at night, raise steam for generators with it.

And there is one further idea around that, though it relies on new storage tech-

nology being developed, does not rely on that technology being developed specifically for grid-scale storage. This is to use the fleet of electric cars that its proposers hope will take over from ones driven by internal-combustion engines over the course of the next couple of decades.

In the imaginations of such people, the batteries of these cars (which would, when idle, be attached to the grid in order to charge them), could be employed as a giant storage network, to be plundered with the car owners' permission at times of peak demand. It is an intriguing thought—but the overlap between those times and the times cars are most likely to be on the road might scupper it in practice. As might the answer to the question about how ubiquitous electric cars will actually become. For that will depend on the future success and affordability of batteries.

The path from startup to success is littered with corpses, and an awful lot of business models depend for their putative profit on what is, according to your point of view, either a subsidy or a factoring in of the economic externalities (in the form of climate change) imposed by fossil fuels. In particular, Germany's Energiewende and California's Renewable Energy Programme have, by requiring a large fraction of those jurisdictions' electricity to be renewable, helped fuel the boom.

Your bill, sir

The world would no doubt be a better place if the externalities imposed by fossil fuels were properly accounted for in the price of electricity. But that is a hard sell, not least because of disagreements about those externalities' true size. In the meantime, it is better if grid-scale storage can be rolled out without taxpayer support.

That is the main reason for watching the example of Alevo. It says it can make money even in unsubsidised grids, because it has been ruthless about reducing manufacturing costs and simplifying the technology as far as possible.

This is a businesslike approach. If it works, and others prove able to mimic it, then the cost of running a grid, and thus the price of electricity, will fall. That alone will be a good thing. But success will change the very nature of such a grid, enabling it to absorb more wind and solar power even if this is a consequence unintended by the grid owners. How much more is yet unknown, for fossil fuels (particularly natural gas) are getting cheaper too. But renewables will no longer be fighting the battle with one hand tied behind their back. ■



The next picture show

Film projection: Laser-illuminated cinema projectors promise brighter and more realistic images

WHEN Christopher Nolan's sci-fi blockbuster "Interstellar" opened in America in November, he insisted that cinemas equipped with traditional film projectors, rather than their digital successors, could show it two days early. Fellow director Quentin Tarantino has gone further, promising the biggest 70mm film release in two decades for his next Western, and damning digital projection as "the death of cinema as I know it".

It would be easy to dismiss such protests as petulant nostalgia for some half-imagined golden age of celluloid. After all, over 80% of the world's 135,000 cinema screens have converted to digital projection (nearly 95% in movie-mad America), even as global box office takings topped \$35 billion for the first time in 2013. Unlike film prints which rapidly acquire scratches, pops and burn marks, digitally stored and projected films look and sound as good after 100, or 1,000, showings as they did on their premiere night.

But Mr Nolan and Mr Tarantino have a point. Digital projectors cannot match the sheer detail of a pristine 35mm print, nor its rich contrast between the deepest shadows and brightest highlights. And although a digital file itself does not degrade, the xenon arc lamps that illuminate digital

projectors fade over time. They can lose half their brightness in just a few hundred hours and cost \$1,500 each to replace.

Things get murkier faster if a film is projected in three dimensions. By definition, stereoscopic 3D films show a different image to viewers' left and right eyes, thus cutting a projector's apparent brightness in half. Polarising filters, used in most 3D cinemas, halve that again. The glasses worn by the audience take a fifth of what's left. Pity the unlucky patron who watches a 3D film at the end of a projector's lamp life: he might see just a tenth of the intended brightness. Little wonder, then, that 3D films have earned a reputation for dimness and causing eyestrain. Nearly three quarters of people opted for the 3D version of a film in 2008. Less than 40% do today.

A brilliant idea

One possible solution involves that cinematic staple: laser beams. Rather than being attached to a shark's head, used to intimidate an immobilised secret agent or vaporise a rebel planet, these lasers are kept safely in the projection booth. Laser-illuminated projectors cannot only deliver brilliantly bright images, in either 2D or 3D, but also promise better contrast, more natural colours, ultra-realistic high frame rates

and resolutions that might finally approach those of film.

The lasers are not fired directly at the screen, as in some planetaria, but contained entirely within a digital cinema projector. At the heart of these machines are spatial light modulator chips, usually based on digital micromirror devices. The chips, which are just a few centimetres across, contain up to 2m aluminium mirrors that can be individually controlled to reflect incident light. Each one corresponds to one pixel of resolution, and a projected image is built up by combining beams of primary red, green and blue light from three modulator chips.

In a traditional digital projector, a high-pressure xenon arc lamp illuminates the chips. Even without their tendency to fade, arc lamps are less than ideal. They generate light in all directions and over a wide range of frequencies, so a series of prisms and filters is needed to split it into red, green and blue, and to direct those beams onto the micromirrors. Arc lamps can only be made brighter by making them bigger, which makes the light harder to control. The best xenon projector lamps today typically offer around 30,000 lumens of brightness.

Illuminating the same chips with lasers eliminates many of these problems. Laser diodes are small, semiconductor devices that turn electricity directly into laser light. They generate very narrow wavelengths, so there is little excess light or heat, and last for tens of thousands of hours. Their uniform light is easy to work with.

The first commercial laser cinema projectors contain hundreds of tiny laser diodes and offer around twice the brightness (60,000 lumens) of xenon-based projectors, while consuming only about half ►►

Laser-illuminated projectors have more to offer than just improved 3D

► as much electricity. However, even doubling the brightness of existing 3D systems would leave many films looking dull and gloomy. Handily, lasers also enable a more advanced type of 3D operation.

Most of today's 3D projectors have a filter that alternates rapidly between left- and right-handed circular polarisation, synchronised to scenes shot from slightly different perspectives. The viewer, wearing spectacles with lenses of opposing polarity, sees only the correct scene in each eye and thus perceives a 3D image.

An alternative 3D system relies on the human eye being easily fooled. People often perceive colours to be identical that are in fact composed of subtly different wavelengths of light. These colours are called metamers. Metameric, or colour separation, 3D uses distinct bands of red, green and blue light to make up the scene destined for each eye. Spectacles using special colour-filtering dichroic lenses then allow only the correct image to be seen.

Extracting the six different colours necessary for metameric 3D from a xenon lamp's broad spectrum is tricky. Like polarisation, it involves filtering out most of the useful light to keep the small portion that is needed. Lasers, on the other hand, can be tuned to emit only the wavelengths needed. This means that almost all of the light they generate ends up on the screen, helping high resolution 3D films look every bit as bright as their 2D brethren.

Laser-illuminated projectors have more to offer than just improved 3D. They can reproduce up to 60% of the colours that most people can perceive, compared with 40% for xenon projectors, and with much better contrast. They can also project films at higher rates than the traditional 24 frames per second (FPS), allowing crisper depiction of fast-moving action. Ultimately, they should pack more detail into each frame and rival the best film stock.

Laser projectors are not without problems. Early ones suffered from a phenomenon called speckle, an ugly visual effect produced by waves of the same frequency interfering with each other. Lasers are also expensive. A xenon-based projector might cost \$60,000 but a first-generation laser projector can run to \$500,000. Even with savings in electricity and replacement lamps, the new set-ups still cost between two and four times as much.

The switch from film to digital projection primarily benefited distributors, who no longer had to produce tens of thousands of reels of 35mm film at around \$1,000 each. To boost demand, distributors

and projector manufacturers offered cinema owners a subsidy. With no suggestion of a similar scheme for the much pricier upgrade to lasers, it is likely that cinemas (and customers) will have to foot the bill.

And yet a few laser systems are already being installed. In November the Cinerama cinema in Seattle unveiled the country's first laser-illuminated projector, a dual projector made by Christie, an American manufacturer, as part of a multi-million dollar refit. Ryan Hufford, a systems engineer at Cinerama's parent company Vulcan, would not comment on the finances, saying only: "We work for [ex-Microsoft billionaire] Paul Allen. He has charged us always to be looking for the



Peter Jackson ups the rate

newest, most innovative technology."

A few other high-end cinemas with deep pockets have signed up, notably the IMAX chain, whose staple 70mm film projectors are now rather dated. But there is no sign of a mass shift to lasers. The obstacles are not purely financial. At the moment, special licences must be obtained from the Food and Drug Administration, which imposes additional requirements on staff.

Even more frustrating for cinema owners is that some of the touted benefits may not arrive for years, if at all. Larger hard drives will be needed to store the additional data that comes with higher resolutions and frame rates, for one thing. But the biggest barriers are probably not technical. "The chips will look after themselves," says Bill Beck, a long-time proponent of laser-illuminated projection now working

for Barco, a projector manufacturer. "Getting all the constituents together and agreeing standards is what takes the time."

In 2002 Hollywood's seven major film studios set up a joint venture called Digital Cinema Initiatives (DCI) to establish standards for everyone from film-makers to cinema proprietors. It was sluggish to get going, taking years to issue its first specification, and generally trails developments. This summer, DCI insisted that laser projectors continue to conform to existing standards, limiting improvements to resolution, colour and frame rates, while it works on updating its specifications again. Without properly encoded and encrypted movie files from the studios, even the most high-tech directors will not be able to get their work in front of an audience.

Mr Beck suspects that cinemas keen to start defraying the cost of their projectors might not be prepared to wait. Some, he believes, will go ahead. "But until Hollywood says what the colour gamut, the frame rate and the dynamic range are going to be, and then supports that with production versions of their movies, it's just going to be technology testing."

Hobbits ahead

Even if all the benefits of laser projection can be realised, there is no guarantee that audiences will appreciate them. The late Roger Ebert, a noted critic who worked for the *Chicago Sun-Times*, loathed 3D films for many artistic and practical reasons, only one of which was that they were too dim. And the reception of a subsequent innovation has, if anything, been worse. When director Peter Jackson released the first instalment of his Hobbit film trilogy in 2012, it was available at two frame rates: 24 FPS and 48 FPS. Some critics loved the high frame rate, others thought it overblown, artificial or looking as though the film was shot on cheap videotape. The only other 48 FPS releases since then have been the remaining Hobbit films, although James Cameron is said to be considering high rates for sequels to the sci-fi epic "Avatar".

Mr Ebert once said, "Whenever Hollywood has felt threatened, it has turned to technology." In an age of mobile devices, streaming video and infinite choice, it is easy to see the appeal of a technology, however expensive, that promises to accentuate the differences between immersive, experiential cinema and watching a film on a tablet. But if we have learned one thing about lasers from the silver screen, it is that they can be very dangerous in the wrong hands. ■

Tesla's electric man

JB Straubel is charged with more than electrifying the Californian carmaker. He wants to take batteries to a new dimension

PUT your foot down in a Tesla Model s and the experience is rather different to other cars. The usual exhaust roar is replaced by a hushed whooshing sound as the car accelerates rapidly—and relentlessly—thanks to the high torque of an electric motor making gear changes unnecessary because there is no gearbox. And inside, instead of multiple dials and switches, a large touchscreen dominates the centre console. Established carmakers have tended to make modest electric vehicles, usually small ones to eke out the range available from their pricey batteries. But it was Tesla, a Silicon Valley startup, which realised that many early adopters of new technologies are likely to be well heeled and would prefer a large high-performance saloon that is both luxurious and extremely high-tech.

Why did Tesla act differently? For a start, it does not think of itself as a carmaker. “I see us more as an energy-innovation company,” says Jeffrey “JB” Straubel, the firm’s chief technology officer, and one of the co-founders of Tesla, along with Elon Musk, the chief executive. “If we can reduce energy-storage prices, it’s the most important thing we can do to make electric vehicles more prevalent,” says Mr Straubel. “Add in renewable power and I have a direct line of sight towards an entire economy that doesn’t need fossil fuels and doesn’t need to pay more to do it.”

Mr Straubel’s captivation with energy storage is understandable. He is cagey about the exact cost of the lithium-ion (Li-ion) battery pack powering the Model s, but it is believed to represent around a quarter of the \$70,000 starting price of the basic version. A smaller car, the Model 3, is due in 2017. Although the new car will have some self-driving features like the Model s, it is aimed more at the mass-market. But to hit the Model 3’s expected price of around \$35,000, Mr Straubel now needs to reduce the cost of his battery packs by at least a third.

The best way to do that and to meet expected demand, Mr Straubel believes, is for Tesla to make its own batteries. And to make them big time. This is why he and Mr Musk are gambling on building a \$5 billion “gigafactory” in Nevada in a joint venture with Panasonic, a Japanese bat-

tery supplier. By 2020 the gigafactory is set to produce as many Li-ion batteries as the entire world used this year.

The determination to act boldly and independently has worked for Mr Straubel in the past. When researching a charging system for the Model s he rejected existing industry standards because they delivered too little power. And instead of waiting for an agreement with other carmakers for a universal recharging plug, he designed his own proprietary connector. The company’s Superchargers, which provide free recharging in public locations to Tesla owners, can top up a battery to about 80% of capacity in 40 minutes. These now comprise the largest fast-charging network in the world.

Mr Straubel also takes a different view on the batteries themselves. Whereas most manufacturers of electric vehicles have opted for large-format batteries, both the Model s and its predecessor, the Tesla Roadster, are powered by around 7,000 individual Li-ion cells. The Roadster’s were originally the standard Li-ion cells widely used in industry and found in devices such as laptop computers. For the Model s, however, the cells have been significantly redesigned. Mounted inside a battery pack, the cells are interconnected and interwoven with liquid cooling systems to prevent fires in the event of an accident (damage resulting in short circuits and faulty charging can cause Li-ion batteries to burst into flame).

The electric Porsche

Teslas were always going to be unique. Mr Straubel, who is 38, made his first full-sized electric vehicle 14 years ago (a golf cart which he resurrected at the age of 14 doesn’t count). This was a 1984 Porsche 944 fitted with twin electric motors and 380kg of old-fashioned lead-acid batteries: a weighty proposition, but one that went on to become the fastest electric car in the world at a drag-racing event in California.

“I love immersive experiences where you’re engaged with the thing that you’re engineering. If you are driving, riding or flying it, it’s even more exciting and fun,” says Mr Straubel, who holds a private pilot’s licence. After graduating with a master’s degree in energy engineering from Stanford University, he worked with Harold Rosen (the designer of the first geosynchronous satellite) on a novel hybrid-drive system for cars. This used a turbine to generate electricity and a fast-moving flywheel to store and release kinetic energy when needed. Although



"One lunch was the beginning of what eventually became Tesla"

► the innovative combination worked, it was a leap too far for conservative carmakers, which declined to invest in it. Nevertheless, the pair licensed the technology to a company that makes flywheels for commercial vehicles. Mr Straubel and Mr Rosen went on to build a hydrogen-powered electric engine for aircraft, which was subsequently licensed to Boeing.

It was then that Mr Straubel met Mr Musk, a freshly minted multimillionaire from the sale of his PayPal digital-payments company to eBay. "One lunch was the beginning of what eventually became Tesla," says Mr Straubel. "We spent most of the meal talking about electric aeroplanes. But as we were wrapping up, I said I was working on a fun crazy project with cars, trying to build a lithium-ion battery pack that could last 1,000 miles."

That dream is still some way off. The Model 3 is likely to have a range of 322km (200 miles) compared with the 440km claimed for a top-of-the-line Model S. But with Tesla intending to sell ten times as many Model 3s, the need for a reliable battery supplier is paramount. Hence the gigafactory. Tesla will have to innovate in battery chemistry and manufacturing techniques even as it ramps up production. Although the new cells are likely to remain small, their exact specifications are still undecided.

Mr Straubel insists that this strategy is less risky than it might seem. He notes that Model S cells today are produced on equipment very similar to that used for the Roadster cells almost ten years ago, even though the energy from the cells has increased by half and their chemistry has changed substantially. The Roadster cells used cobalt oxide as a cathode whereas the Model S uses a nickel-cobalt-aluminium oxide. The difference, says Mr Straubel, is a much improved energy density, a longer lifetime and a higher operating temperature (which means less cooling is required). Besides the chemistry, Tesla is also developing other new features for the batteries.

The idea is that, benefiting from economies of scale, the gigafactory's cells will be significantly cheaper than those from more established manufacturers. "Over the next ten years, it's going to change to the point where we're focused on production to meet the world's energy-storage needs rather than waiting for a cost reduction from a radical change in battery technology," says Mr Straubel.

Not everyone agrees. A report by Lux Research, a firm of technology analysts,

has predicted that the gigafactory will bring about only a modest cut in battery costs and suffer more than 50% overcapacity. "Most other companies do not believe that battery volume will grow as fast as it's going to," Mr Straubel counters. "They don't understand the tight linkage between cost and volume. We're at this crossing-point where a small reduction in cost is going to result in a ridiculously big increase in volume, because the auto industry is so big."

Not all the cells made by the gigafactory are destined for vehicles. Some will end up in the company's Superchargers, allowing Tesla to cope with sudden bursts of demand should multiple vehicles need to recharge at once. Others will be used at Tesla's assembly plants to store energy when it is cheap, typically at night, and release it when the price rises.

Keeping the lights on

The use of batteries to store renewable power (see TQ cover story) may provide Tesla with its biggest opportunity in the years ahead. The potential is huge, says Mr Straubel. "The economics in many cases have already crossed a threshold where battery packs can effectively store renewables on a very big scale." The main problem with renewable-power sources, such as wind or solar, is that the wind does not always blow or the sun shine when demand for electricity is high. This requires utility companies to maintain additional power stations, usually running on fossil fuels, to meet the shortfall. Batteries, however, could store the power from renewables when it is generated and release it when needed.

Around 1,000 households in California already have a Tesla battery pack installed alongside photovoltaic panels leased from Solar City, another company owned by Mr Musk. The battery packs allow householders to run appliances if the power goes out or switch when electricity prices are high. But they are also designed to maximise the return from "net metering" rules that allow residential customers to sell excess energy to utilities.

Tesla's residential batteries have been plagued by interconnection problems with utilities and are not being adopted as swiftly as Mr Straubel had hoped. "Utilities tend to be very conservative by nature," he says. Nevertheless, Mr Straubel thinks that favourable economics will persuade utilities of the benefits.

As batteries improve in terms of safety and the amount of energy they can store,



this will allow new electrically powered products to be produced, reckons Mr Straubel, returning to another of his interests: "In the foreseeable future, electric aeroplanes become an interesting and pretty compelling proposition." A variety of small electric aircraft have been built in America, China and Europe. Airbus recently set up a subsidiary in France to build a two-seater pilot-training aircraft called the e-Fan. It is powered by electric motors driving a pair of ducted fans on either side of the rear fuselage. The European aerospace giant is also looking at the potential of building an electric helicopter and a 90-seat electrically powered passenger plane for short journeys.

A number of developments are under way which have the potential to boost the amount of energy a battery can store. For instance, a team at Stanford University is investigating enclosing the lithium-based anodes used by Li-ion batteries in a thin film of carbon "nanospheres". This would allow more lithium to be used safely in the anode (it is lithium's high chemical reactivity that puts the batteries at risk of catching fire). The coating, researchers think, would allow a Li-ion battery to hold about five times as much energy as those used today, weight-for-weight.

Such innovations are still at the laboratory stage and remain some way from commercial reality. In time, perhaps, even lithium may be replaced by more exotic new materials in batteries. "No one wishes we could come up with a technology that makes today's chemistry obsolete more than me," says Mr Straubel. "We could sell more cars at a lower price. But we're not waiting." ■

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Israeli politics

Bibi's bust-up

JERUSALEM

The coalition breaks up halfway through its term. But Binyamin Netanyahu is still the man to beat

IT WAS another gamble by Israel's prime minister. After weeks of political infighting, Binyamin Netanyahu called for fresh elections "as soon as possible", signalling the end of his government less than halfway through its four-year term. Just before his press conference on December 2nd, he fired his justice and finance ministers, Tzipi Livni and Yair Lapid. They were disloyal, he said, and were plotting a "putsch" against him. "I am taking a risk in order to improve the governance," he declared.

It is not the first time the prime minister has thrown the dice so as to maintain support on the right. He has infuriated the American government with relentless expansion of Jewish settlements; he has stood by as radicals, including members of the Likud party, made provocative visits to pray atop the Temple Mount (where Muslim holy places were built on the ruins of the ancient Jewish temple); and, after years of inaction, suddenly pushed a controversial bill to declare Israel the "national state of the Jewish people", which would relegate non-Jewish citizens to a secondary status. Centrist ministers, including Ms Livni and Mr Lapid, voted against it in cabinet and threatened to leave the coalition when it came to a vote in the Knesset.

A meeting between Mr Netanyahu and Mr Lapid on December 1st to save the coalition ended badly. Mr Lapid rejected an ultimatum to back the bill and drop his signature economic initiative, a scheme to ex-

empt first-time homebuyers from value-added tax. So on December 3rd the Knesset approved a preliminary motion to dissolve itself, with a final vote on December 8th. The election will be on March 17th.

The break-up coincides with the first economic contraction in five years and a rash of deadly Palestinian attacks. Yet the current infighting is not about either of these issues. Nor is it about peace talks with Palestinians, defunct since the latest round of American-brokered talks collapsed in April. Instead the campaign will be dominated by questions of personality, not least whether the once-cautious prime minister remains a safe pair of hands. "At the end of the day, these elections are all about a referendum on Bibi," says Amit Segal, an analyst for Israel's Channel 2.

On the face of it, Mr Netanyahu is in trouble. His approval ratings hover around 40%. Barack Obama's administration cannot stand him, and European countries are slowly moving to recognise Palestinian statehood and debate sanctions on settlements. Mr Netanyahu's outgoing coalition partners, meanwhile, have been increasingly bold about challenging him. Last month the Knesset approved a preliminary law to limit the distribution of *Israel HaYom*, a free daily with a strong pro-Netanyahu line financed by Sheldon Adelson, an American casino magnate. Many "yes" votes came from coalition supporters. Then there was what Mr Netanyahu called

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the putsch. Rumours have circulated for weeks that Mr Lapid and Yitzhak Herzog, the Labour Party leader, were plotting to form an alternative coalition with ultra-Orthodox parties. The two men dismissed the talk, saying that they would not enter a new government before an election.

Mr Netanyahu remained fearful of a surprise, so he took a bet on an early poll. He was no doubt reassured by recent opinion-poll numbers showing Likud winning a plurality of between 22 and 24 of the 120 seats. The second-largest block would be the right-wing Jewish Home, headed by his most loyal ally of the moment, Naftali Bennett. Two other trends are encouraging Mr Netanyahu: an increasingly right-wing electorate and a fragmented political map, especially among middle-class voters in and around Tel Aviv, who back a new party that emerges with each election.

Last year it was Mr Lapid's Yesh Atid, which ran promises to help small businesses, cut subsidies to the ultra-Orthodox and pay conscript soldiers a minimum wage. He surprised pollsters by coming second. This time it will be Moshe Kahlon, a former communications minister and Likud member. Mr Kahlon has done no campaigning, has not chosen a list of candidates or even named his new party. Yet polls have him winning 10-12 seats. His main political achievement was to reform the mobile-phone market and drive down prices, for which he remains popular.

It is hard to see any politician on the centre-left emerging as a viable candidate for prime minister. Mr Herzog is regarded as bland and uninspiring. The articulate and feisty Ms Livni may be past her political peak. Mr Lapid is tarnished, with little to show for his two years as finance minister. Leading economists panned his VAT exemption scheme, calling it a costly measure that would do nothing to increase the ►►

► supply of housing, the underlying reason for high prices.

Other variables could upset the balance. Three parties that represent Palestinian citizens of Israel are discussing a unity deal. The threshold to enter the Knesset has been raised from 2% of the vote to 3.25%. If they run alone all three could be pushed out of the Knesset; together they might make up the fourth-largest group. Meanwhile Avigdor Lieberman, the right-wing foreign minister, is hedging his bets. He broke his party's unity pact with Likud earlier this year, and seems to be tacking toward the centre, releasing a "peace plan" last week that endorsed a two-state solution. Yet it is Mr Netanyahu—denounced abroad, under attack at home, accused of having no vision for Israel and more impulsive than in the past—who remains the person to beat. ■

Air strikes against IS

Phantoms in deconflict

CAIRO

The air war against IS is getting crowded

IRAN officially denies it, but pictures tell a different tale. Aired by Al Jazeera, the Qatar-based television channel, they show ageing Iranian Phantom fighter-jets bombing in support of an Iraqi attack on Islamic State (IS) positions in Iraq. It is no secret that Iran backs both the Shia-dominated government of Iraq and the Assad regime in Syria. Yet the insertion of its aircraft into a theatre that spans both countries underlines the increasingly tangled and messy nature of the conflict, where skies are already crowded with American, Allied and Syrian jets.

Iran and America are ostensibly sworn adversaries. The Islamic Republic has even frostier relations with some of America's Arab allies. Both sets of Iranian foes are aiding rebels fighting against the Syrian government, which is heavily supported by Iran. Yet since Iraq's democratically elected government has welcomed both the Iranians and the American-led coalition as allies, it is not surprising that they should find themselves as de facto comrades-in-arms against the menace of IS. "We are not co-ordinating nor are we deconflicting with Iranian military," insists a spokesman for America's defence department, referring to the co-ordination of aircraft to avoid collisions.

In fact, American and Iranian forces have so far run little risk of fraternisation in Iraq. America has focused on intelligence, air power, training of government troops and helping to woo Sunni tribes in the

Law in the Middle East

Judge like an Egyptian

CAIRO

Has Egyptian justice become an oxymoron?

NUMBERS tell part of the story. On November 29th an Egyptian judge absolved Hosni Mubarak, the country's former president, and seven of his security chiefs of responsibility for the killing of some 239 people during 18 days of protests that led to Mr Mubarak's overthrow. They became the latest in a roster of happy officials whom courts have declined to blame for more than 2,000 civilian deaths in clashes with the police during and since the January 2011 uprising. Days later another judge sentenced 188 people to hang for the murder of 14 policemen, bringing to over 1,000 the total of capital punishments (many since commuted) for political crimes this year.

No death sentences have been carried out, and both these cases will be appealed. Besides, no two crimes are equal: the 14 murdered policemen were savagely slaughtered in a mob assault with rockets, machineguns and machetes on a village police station. By contrast it may be harder to establish a chain of causality linking state officials to the far greater toll of deaths inflicted by policemen.

But the disparities go deeper than numbers. In scores of trials involving government officials, judges have dismissed or ignored compellingly incriminating evidence and state prosecutors

have built suspiciously flimsy cases. Mr Mubarak remains in prison only because one dogged government whistle-blower, since demoted, kept receipts revealing the diversion of some \$20m of tax money into refurbishing private presidential residences. His interior minister, who oversaw a long reign of torture and other police abuse, is serving time because of a dodgy contract for licence plates.

Meanwhile hundreds of members of the Muslim Brotherhood, banned after the coup in July 2013, languish in jail. Many are awaiting trial more than a year after their arrest. Scores of secular activists are in prison too, often simply for protesting peacefully. The judge who wants to hang 188 people earlier sentenced three Al Jazeera journalists to stiff terms. Observers at their trial saw no evidence of criminality.

To many Egyptians, such justice seems geared to punish those who dare to challenge the state, and to rebuild the near-impunity enjoyed by officials in Mr Mubarak's time. The former president's judge has gone even further. His rambling 2,400-page ruling praises the nobility of the security forces, attributing the hundreds of dead from the 2011 uprising instead to a Zionist-American-Muslim Brotherhood plot.



west of Iraq. Iran has pumped up Shia militias that viscerally shun America, and lent small numbers of troops and advisers for operations in the east, close to its border. Interviewed by the *Los Angeles Times*, one prominent Iranian politician noted that Iran sees this zone—the farthest eastward advance of IS—as a buffer in which military threats “will not be tolerated.” Despite its backing for Shia militias, Iran has not stood

in the way of American-backed initiatives such as the recent settling of a long and bitter dispute between officials in the Iraqi capital, Baghdad, and the Kurdish autonomous region over oil revenues.

Things are not so cosy in Syria. Coalition aircraft have not fired on Syrian government forces, which are fortified by Iranian weaponry, Iranian “advisers” and Iranian-backed Lebanese and Iraqi Shia ►►

ENDURING SUPPORT

The background of the entire page is a composite image. The upper portion shows a clear blue sky. Below the sky, an aerial perspective of a city with a grid-like street pattern and numerous buildings is visible. This city view is framed by a dark, angular structure that resembles the interior of an aircraft cockpit, specifically the instrument panel and control yoke area, which is visible on the right side of the image.

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► “volunteers”. But Syria’s air force, generously restocked by Russia, mingles uncomfortably in the sky with coalition aircraft. One monitoring group reckons that coalition strikes may have killed 50 civilians in Syria since September (along with more than 700 IS fighters). Meanwhile the Syrian air force has killed at least 300 using barrel bombs alone. In the last week in November residents of Raqqa, the biggest

Syrian city under IS control, endured dozens of indiscriminate daytime raids by Syrian planes, followed by precision strikes at night from the coalition. The effect is to reinforce the impression that the coalition is acting as Syria’s ally, weakening moderate forces. Instead of heeding calls from embattled mainstream rebels for the creation of a no-fly zone, Syria—and Iraq—are turning into a free-for-all zone. ■



Oman's succession

After the sultan

MUSCAT

Can a peaceful and prosperous nation stay that way?

ON AN average day a resident of Muscat, Oman’s seafaring capital, is likely to drive down Sultan Qaboos road, pass Sultan Qaboos Grand Mosque and perhaps Sultan Qaboos port, too. He or she may be a graduate of Sultan Qaboos University and watch a football match at the Sultan Qaboos sports complex before heading home to a house in Medinat Sultan Qaboos, a neighbourhood of the city.

If one man dominates the country, that is because since 1970, when he overthrew his father, Qaboos bin Said al-Said has ruled the Gulf state as an absolute monarch, albeit a benevolent one who has both unified and modernised Oman.

His dominance has not concerned many until recently. But for almost six months the 74-year-old sultan has been under the care of doctors in Germany with what is said to be colon cancer. Unmarried, he has no heir or designated successor. Government media tried to spin an address he gave on state television earlier this

month—the first time Omanis have seen their ruler since he left the country—as a positive sign. But the sultan looked indisputably frail. His enigmatic reference to his absence from the country “for reasons that you know” raised eyebrows, since no official announcement has been made about his illness. The business of state, slow at the best of times, has slowed further.

Jitters are now rising because economic conditions are worsening. Oman’s biggest challenge is to wean itself off over-dependence on hydrocarbons, state spending and public employment. So far the government is betting on infrastructure projects such as Duqm port, a big complex on the southern coast that is under construction. But the fall in the oil price to \$70 a barrel is the subject of urgent debate, since it will almost certainly push Oman into deficit next year. Economic grievances and a lack of jobs were a factor behind Oman’s small version of the Arab spring protests in 2011. At some point Oman will need to tighten

its belt as oil revenues fall; officials suggest cutting subsidies (perhaps on petrol) and taxing expatriates’ remittances.

And yet, as in other Gulf states, Oman’s social contract relies on the government’s generous provision for its population in return for citizens not asking for too many rights. Populist measures taken in response to discontent in 2011 now pose a problem: an already bloated public sector employed 50,000 more people. Although Oman comes 66th of 189 countries in the World Bank’s rankings for ease of doing business, most of the businessmen who mill around Muscat’s Grand Hyatt hotel complain of a lack of transparency.

Omani law stipulates an idiosyncratic procedure to find a successor. On the sultan’s death the scions of the ruling Al Bu Said family have three days to decide who will take his place. If they cannot agree they will open an envelope left by the sultan containing the name of his chosen successor. Word has it that his three cousins—Assad, Shihab and Haithem bin Tariq al-Said—are front-runners. Little is known about them. Few Omanis want to face up to their ruler’s mortality because “quite simply, his majesty’s shoes are too big to fill,” says Ahmed al-Mukhaini, an analyst. “That could be a good thing, as it means the next sultan will have to share power.”

Sultan Qaboos is seen as a visionary by Omanis and expatriates (including Western diplomats) alike. Over 44 years the sultan has used the oil money of his Gulf state of 4.1m people, of whom some 40% are expatriates, to transform Oman from a backwater with few miles of paved road into a prosperous state with generous social provision. He also unified it, quelling separatist agitation such as the rebellion in the Dhofar region between 1962 and 1976. Omanis note that their country is less rich than neighbouring Saudi Arabia, but their ruler has done much more with its wealth. The sultan has made friends with everyone, including arranging talks between the West and Iran, much to the consternation of Saudi Arabia and the United Arab Emirates. The country feels as much part of Asia as of the Arab world.

There is little agitation for political change. But any new ruler will not only lack the sultan’s popular touch but also face a population that was mostly born after 1970 and does not remember the country’s less comfortable past. Omanis have been heartened by high-profile corruption trials, including one involving Muhammad al-Khusaibi, a former commerce minister, who was sentenced to three years in jail in May. A good few are disappointed with the lack of political reform, and the fact that security services appear to have taken on a more prominent role since 2011. Even so, looking around, Omanis reckon that their country is in far better shape than most of the wrecks in the region. ■



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Sudan and the UN

Mission in trouble

Leaks and whistle-blowing expose the UN mission in Darfur

PEACEKEEPING is a thankless task, but the United Nations-African Union Mission in Darfur (UNAMID) has proved more controversial than most. Now the 16,000-strong force faces demands from Sudan for it to leave, and questions about its impartiality. The UN must soon decide whether to extend the unhappy mission.

UNAMID was imposed on a reluctant Sudanese government in 2007, after the worst of the fighting between Darfuri rebels and government forces was over. The conflict has claimed some 300,000 lives and led to charges of genocide against Sudan's president.

Matters have come to a head over reports of an attack by Sudanese soldiers in the village of Tabit on October 31st and November 1st. The troops are reported to have gone on a rampage, apparently in revenge for the disappearance of one of their own. They allegedly raped some 200 women. UNAMID eventually negotiated permission from the Sudanese authorities to investigate Tabit on November 9th. Thereafter it declared that it found no evidence of such crimes and that villagers "coexist peacefully" with the army.

This sunny conclusion was greeted with astonishment by many Darfuris, for social media were by now carrying eyewitness accounts of the violence. It also prompted a leak of UNAMID's internal report, which is gravely at odds with the official statement. This report explained how uniformed and plain-clothes Sudanese military officials had infested Tabit while the UN team was there, ensuring that "an environment of fear and silence prevailed". People were warned not to talk.

UNAMID's apparent doublespeak over Tabit will have come as no surprise to the mission's former spokeswoman, Aicha Elbasri. She resigned last year in protest

against UNAMID's ignoble history of such discrepancies, which, in her view, amounts to an organised "cover-up" of the violence in Darfur. The UN's conduct over Tabit, she says, has been entirely consistent with her own experience of the "huge gap between the reports that we got from the field and the reports that go to the public."

The cause of such a cover-up, argues the Moroccan-born Ms Elbasri, is the hybrid nature of the mission. The African element of UNAMID, controlled by the African Union (AU), "is completely against justice" for ordinary people and is mainly concerned with defending one of its own, President Omar al-Bashir. For the same reason the AU has been a fierce critic of the International Criminal Court, which has indicted

Mr al-Bashir for war crimes (see page 71).

As if to confirm Ms Elbasri's conspiracy, Mr Bashir is redoubling his efforts to get rid of the mission now that UNAMID's tendency to self-censorship has been sabotaged. A supine UNAMID was one thing, it seems; a mission containing a few people who might do their jobs properly quite another. He has already closed the mission's human rights office.

The UN will have to decide whether to infuriate Mr al-Bashir further by renewing the mission's mandate beyond next June. It is still dealing with claims of a cover-up, which the UN secretary-general, Ban Ki-moon, has called "very troubling". That might be an apt description of UNAMID's entire, sorry history. ■

The emir of Kano

Banker v Boko

LAGOS

From inflation targeter to insurgent target

LAMIDO Sanusi was never afraid of offending. "I love controversy", the Muslim leader said earlier this year. "If you think there has to be change... you need to step on a few toes."

Mr Sanusi lived by that mantra as governor of the Central Bank of Nigeria, embracing reform and rooting out corruption. He was sacked in February after claiming that some \$20 billion of oil revenues had gone missing from government coffers. The powers-that-be were irked when, only four months later, he was made emir of Kano.

Emirs, traditional leaders of the north, wield great influence and the Kano post is the second-highest ranking of all. They usually stay out of politics. But once installed in his palace, Mr Sanusi has been catapulted back to the centre of another national crisis: this time, the insurgency in Nigeria's north. He caused a stir last month by calling on Nigerians to arm themselves against the Boko Haram insurgents waging *jihad* on the state. Residents should not wait for help from the military, he was reported as saying. They should "acquire what they need to protect themselves". Police angrily said this was a "call for anarchy".

Civilians are already playing an active role in fighting the insurgents through local vigilante groups. Mr Sanusi echoed a growing feeling among politicians that, as the military fails, arming civilians may be the best way to secure the north, said one well-placed analyst who requested anonymity.

Mr Sanusi has been as exposed to the vengeance of the insurgents as he was before to that of the government. On November 28th suspected Boko Haram



Sanusi, dressed to kill?

militants attacked the central mosque in Kano, next to his palace, killing at least 130 worshippers with bombs and guns. Mr Sanusi was quick to say that the assault took months to plan and was not provoked by his comments. Either way, the attackers had singled out the mosque, possibly expecting him to be there (as it happened, he was overseas).

Mr Sanusi is not the first emir to speak out against Boko Haram's extremist brand of Islam, nor to be targeted for doing so. The emir of Gwoza was killed by gunmen earlier this year. Two others narrowly escaped with their lives in the attack. Mr Sanusi came back straight after the Kano bombings and led prayers at the mosque the following day. He said: "We will never be intimidated into abandoning our religion."





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Georgia and Russia

Dreams deferred

TBILISI

Georgia is frittering away the gains of liberal reforms

RUSSIA'S unacknowledged war in Ukraine did not start with the annexation of Crimea. The precedent was set six years earlier, during a five-day war between Russia and Georgia that resulted in Russia's occupation of the regions of South Ossetia and Abkhazia. Unwilling to confront Russia directly, Western leaders instead blamed the recklessness of Mikheil Saakashvili, Georgia's president at the time. That was when Vladimir Putin, Russia's president, reportedly began talking about Crimea.

On the face of it, Georgia's relationship with Russia has since much improved. Flights have been restored, and bans on Georgian wine, mineral water and fruit lifted. Yet Georgia may now be more vulnerable than ever. If Ukraine crumbles under Russia's pressure and its own failings, Georgia could be the next target.

A small country that reinvented itself under Mr Saakashvili, Georgia is of strategic importance to Russia and its control over the Caucasus. Gas and oil pipelines from Azerbaijan to Turkey pass through the country. With Armenia choosing an alliance with Russia over Europe and Azerbaijan being courted by Moscow, Georgia is the last piece of the puzzle.

Georgia's Euro-Atlantic aspirations remain a clear challenge to Mr Putin's at-

tempts to redraw international borders and keep NATO out of former Soviet territory. Last month Mr Putin signed a new treaty strengthening Russia's grip on Abkhazia. For Georgia's government, which had obliged Russia by refusing to join EU sanctions and arguing against arming Ukraine, this was a slap in the face.

Mr Putin sees Georgia not as an independent country, but as a card in a bigger game between Russia and the West. Although a military invasion can never be ruled out, the Kremlin is more likely to exploit Georgian political weakness, as it did in Ukraine (under the ousted Viktor Yanukovich) and more recently in Moldova (see next story). If Russia fails to lure Georgia into its sphere of influence, it will try to destabilise it so much as to make it unpalatable to the West. Developments in Georgia in the past two years make the task easier.

Two years after Bidzina Ivanishvili, Georgia's richest man, led the Georgian Dream coalition to victory over Mr Saakashvili's United National Movement, the country's politics are a noxious mix of ineptitude and vengeance. Georgia under Mr Saakashvili had many faults, but in the early years of his government the country was buzzing with ideas, projects and reforms. Today's Georgia feels stagnant and confused, lacking any sense of direction. "This

government has no clear ideas—only interests," says Georgy Khukhashvili, a former adviser to Mr Ivanishvili who has since turned critic.

Having attacked Mr Saakashvili's team for its lack of transparency, Mr Ivanishvili has created something far more opaque—a kind of shadow state. Although he has had no official post since stepping down as prime minister a year ago, Mr Ivanishvili remains the most important decision-maker in the country, periodically descending from his hilltop residence overlooking Tbilisi to work his political will. Tinatin Khidasheli, a member of parliament whose Republic Party is part of the Georgia Dream coalition, likens Mr Ivanishvili's legitimacy to that of a Georgian patriarch. "Believe me, if Mr Ivanishvili was not involved, things would be much worse in Georgia today," she says. That many of Mr Ivanishvili's critics agree is a powerful indictment of his protégé, Irakly Garibashvili, the prime minister and a former manager in his business group.

The Georgian Dream coalition, brought together with the sole purpose of unseating Mr Saakashvili, is displaying growing cracks. Last month Irakly Alasania, the ardently pro-NATO defence minister and (according to one poll) most popular politician in Georgia, was fired by Mr Garibashvili. A row had erupted after four of Mr Alasania's officials were targeted by prosecutors, in what Mr Alasania described as a politically motivated attack on Georgia's Euro-Atlantic choice. The foreign minister, Maia Panjikidze (who is Mr Alasania's sister-in-law), resigned in solidarity.

Mr Alasania's public sacking pleased the Kremlin, which saw him as an American agent. Mr Ivanishvili went out of his

► way to show that he was behind the decision. Having made his fortune in Russia, only to pull out when Mr Putin came to power, Mr Ivanishvili is said to be afraid of the Russian leader. He seems to be playing for time, hoping that Russia will find some arrangement with America that determines Georgia's future position.

What unites Mr Ivanishvili and Mr Putin is their joint hatred of the previous government. Mr Saakashvili cannot return to Georgia for fear of arrest. Vano Merabishvili, a former interior and prime minister, is in jail. Kakha Bendukidze, who served as a special minister for reforms and did more than anyone else to liberalise the Georgian economy, died recently in London, afraid to return. The list goes on. This does not mean that Georgia is turning into an authoritarian system. It has a free media and strong

political opposition—something it lacked under Mr Saakashvili. As Mr Bendukidze often used to say: “Georgia made a step forward in terms of democracy, but sometimes when you make a step forward you step in shit.”

Yet instead of building on Georgia's reforms, the new government seems to be moving in the opposite direction, repeating many of Mr Saakashvili's mistakes. It has reimposed pointless restrictions on the length of visa-free stay for citizens from the European Union and banned the sale of farmland to foreigners.

Having (rightly) lambasted Mr Saakashvili's government for his extra-judicial prosecutions and heavy-handedness, the new government seems just as keen on its own police and security forces. Mr Garibashvili said recently that strong security

services are a “prerequisite of our country's success, progress, [and] development”. Deputies have pushed through parliament a bill making it easy for the police to eavesdrop on citizens.

All of this has taken a toll on the government. The popularity of the Georgian Dream coalition has dropped from about 70% at its peak to about 40%. But that loss of popularity has not translated into growing support for the United National Movement or any other party. This creates a dangerous and easily exploitable vacuum of power and legitimacy. As Elene Khoshitaria, an analyst and former official for Georgia's NATO integration, puts it, “we can't afford to have a weak government. We have to be A+ students all the time just to stay afloat. Otherwise we sink.” This may be precisely what Mr Putin is hoping for. ■

Russian gas exports

Pipe down

Russia's cancellation of a big pipeline has taught its friends a lesson

GAS pipelines export influence as well as energy. Russia's planned South Stream project was the \$40 billion flagship of its attempt to regain sway in south-eastern Europe. After the failure of the Brussels-backed Nabucco pipeline from the Caucasus, the Russian plan gained a host of supporters, including traditionally Kremlin-friendly countries (Austria, Bulgaria, Italy and Serbia) as well as Croatia, Slovenia and Hungary, which is now treading its own path under the strong-willed Viktor Orban.

Earlier this year South Stream was presenting a challenge to the authority of the European Union. The commission said the plan was illegal: under the rules of the EU's liberalised gas market, a company cannot own both the pipeline and the gas that flows in it. The South Stream countries said they wanted exemptions from that rule.

Then, on a visit to Turkey on December 1st, Mr Putin abruptly announced that the project had been cancelled. The turnaround infuriated his allies and mystified everyone else. What could have prompted Russia to destroy its credibility?

The main reason for the U-turn is money. The plunging oil price has put a huge strain on both public and corporate finances in Russia. Gazprom, the mostly state-owned Russian energy giant, never liked the plan. South Stream was a costly project, with a political rationale (bypassing Ukraine and buying influence in Europe) that dwarfed its business case. EU gas consumption is dropping. So is the gas price. Competition is increasing:



Lithuania, previously 100% dependent on Russia, has just opened an import terminal for liquefied natural gas.

Another reason, says Julian Popov, a former Bulgarian politician and an energy expert, is that EU pressure on member countries has worked. Italy said in November that the project was not a priority. Austria reduced its support. Bulgaria changed its energy policy (and its government) after robust lobbying from Brussels and Washington.

Russia's fallback plan is to export more gas to Turkey. But, as with its new gas exports to China announced this year, such a deal requires costly sweeteners. Mr Putin may hope that energy-starved European countries will vent their frustration on Brussels over the cancellation costs; Bulgaria, he claimed, would lose \$400m in transit revenues. But it is more likely that his erstwhile friends will learn a different lesson.

Moldova's election

Slouching towards Europe

CHISINAU

Pro-Russia parties lose a close vote in a corrupt land

THE election in Moldova on November 30th was as dirty as could be. Pro-European parties accused the Russian intelligence services of illegally funding their opponents. Just before the poll, the courts banned one pro-Russian party for receiving money from abroad, a move its supporters called abusing the judiciary for political ends. In all probability both claims are true. Many voters would agree with Igor Botan, a political analyst, that the choice was between “pro-Europe crooks and pro-Russia crooks”.

Ultimately, three pro-Europe parties won a narrow majority in parliament. Now they must deliver on promises to adopt European Union regulations, made in an association agreement signed in June. EU leaders' renewed attention to Moldova, prompted by the war in neighbouring Ukraine, should provide some incentive. Just before the election, Angela Merkel, Germany's chancellor, wrote to Iurie Leanca, Moldova's prime minister, and mentioned the country's “perspective of membership” of the EU.

Pro-Russia parties want to scrap the EU deal and join Russia's Eurasian Customs Union instead. They include the new Socialist Party, the election's largest single vote-winner. Russia has many tools with which to press its case: in retaliation for the EU deal, it has banned many Moldovan exports, including wine. Roughly half of Moldova's total workforce live abroad; most are in Russia, though going west has become easier since April, when the EU granted Moldovans visa-free travel. ►►

▶ The country's many Russian-speakers are strongly influenced by Moscow's state-controlled television and world-view. Many believe that Romania wants to reabsorb Moldova, most of which was stripped from it by the Soviet Union in 1940. The small autonomous region of Gagauzia, inhabited mainly by Russian- and Gagauz-speaking Turkic Christians, held a referendum in February calling for accession to the Eurasian Union. As a reward, Russia lifted the ban on imports of Gagauz wine.

If Moldova's troubles have international significance, it is partly because of Transnistria, a breakaway region that has been under Russian control since the early 1990s. Senior Transnistrian officials were dispatched early in the Ukrainian conflict to help set up the separatist zones in the Donbas region. Ukrainian officials, who used to show little concern over Transnistria's organised crime and smuggling, have changed their tune. They now say it is a source of arms flowing to their separatists, and they worry that Russia could use Transnistria to open a second front in the war.

Moldova's government is not without honest, dedicated reformers. But much of the state is deeply rotten. The country's oligarchs hope that Europe, given its strategic interest, will give them an easy ride towards further integration. That could backfire; as one former EU official says, many Moldovans are angry with Brussels because they "see corruption and hear nothing from us but words about the rule of law". Without genuine anti-corruption reforms and an improvement in living standards, Moldova's future could instead turn into the one proclaimed on Socialist election posters: "Together with Russia." ■

French politics

Déjà vu

PARIS

Nicolas Sarkozy returns to lead the centre-right against Marine Le Pen

WHEN the French voted in 2000 to shorten their presidential term from seven years to five, the result was to accelerate the rhythm of political life. The next presidential election is not due until 2017, but the race is already under way, the more so after two party-leadership elections this weekend. On November 29th Nicolas Sarkozy, who was president in 2007-12, was elected head of the centre-right UMP. The next day, Marine Le Pen was re-elected leader of the populist National Front. The contours of the next presidential contest are beginning to take shape.

Mr Sarkozy's result was decisive but not



Did you miss me?

crushing. Party members gave him 65% of the vote, well below the 85% he won when he first ran for the leadership in 2004. His closest rival, Bruno Le Maire, a former minister, secured fully 29%, better than expected. With a tireless campaign across the country, Mr Le Maire earned some support on his own account. But he also drew an anti-Sarkozy vote from those wishing to block the former president's comeback. They want either Alain Juppé or François Fillon, both former prime ministers, as the party's candidate in 2017 instead.

Mr Sarkozy's job of unifying the party is both urgent and challenging. Since he vowed to retire from public life after losing the 2012 presidential election to François Hollande, a Socialist, he has watched the UMP tear itself apart. "The level of hatred between us is astounding, grotesque," Mr Sarkozy told his party's deputies this week. He urged a "new start", and promised to change the party's organisation and name. He invited Mr Le Maire to travel with him to meet Germany's Angela Merkel at her party's congress in Cologne on December 8th. And he lunched with Mr Juppé and met Mr Fillon, helping to "clear the air", according to a deputy close to Mr Fillon.

In perhaps his boldest move, Mr Sarkozy put an ally of Mr Le Maire, Thierry Solère, in charge of the party's presidential primary, due in late 2016. Mr Sarkozy may have majority support among card-carrying UMP members. But Mr Solère plans to expand the primary to all voters who declare that they support the right and centre, which could open the race wider. A recent poll made Mr Juppé the favourite among all voters (including the left), with 36% to 21% for Mr Sarkozy. All the same, nobody underestimates Mr Sarkozy's skill at manoeuvring things his way. By promoting Mr Le Maire, who has not declared his

own candidacy for the primary, Mr Sarkozy may also be undermining his strongest rival, Mr Juppé.

For Mr Hollande, Mr Sarkozy's comeback could actually be good news. With his popularity as president at a record-breaking low of 13%, the Socialist leader faces potential rivals within his party in 2017. Yet such is the loathing of Mr Sarkozy on the left that his return to the airwaves and to public debate could help to bond Socialist deputies. This week Bruno Le Roux, the Socialists' parliamentary leader, spoke of a "form of vulgarity" about the former president. Such visceral dislike could, in turn, boost Mr Sarkozy, who thrives on a sense of victimisation.

Yet the greatest threat to both Mr Sarkozy and Mr Hollande comes not from each other, but from Ms Le Pen, who was re-elected with a Soviet-style 100% of the vote. With little fanfare, she is quietly building credibility, organisation and support for 2017. Some polls suggest that she will make it to the second-round run-off, and may even come top in the first round. Nothing would more delight a leader who denounces the unchanging face of the political elite than to be up against exactly the same pair of mainstream candidates whom she faced in 2012. ■

Sweden's government

That was quick

STOCKHOLM

Stefan Lofven's fall shows the strength of the far-right Sweden Democrats

IT WAS supposed to be the Swedish Social Democrats' triumphant return. But two months after forming a minority coalition government with the Greens, Stefan Lofven, the Social Democratic leader, has been forced to step down as prime minister. The four-party centre-right opposition alliance enlisted the support of the far-right, anti-immigrant Sweden Democrats to vote down his budget, pushing through a budget of its own instead. Mr Lofven might have let the other parties try to form a new government. But instead he plans to call an "extra" election on March 22nd.

Such high political drama is rare in Sweden, where advance negotiations before parliamentary votes normally mean the budget passes with little fuss. The only previous special election was in 1958. Social Democratic-led governments, in particular, have usually sat out their four-year terms in an orderly fashion.

But Sweden has never before had to contend with a far-right party that enjoys as much support as the Sweden Democrats. The party is the third-largest in parlia- ▶

ment. Without its backing, neither the centre-right alliance nor a coalition of the Social Democrats, Greens and the small Left party commands a majority. Worse, a new election could see the Sweden Democrats grow stronger, although the absence on sick leave of their leader, Jimmie Åkesson, may count against them. The Sweden Democrats say they blocked the government's budget because it failed to meet their goal of cutting immigration by some 90%. They also accused Mr Lofven of shutting them out of discussions on the budget and other issues.

Mr. Lofven fired back, calling the Sweden Democrats' actions "utterly irresponsible". And he promised that, should he be asked to form a new government, he will continue to freeze them out. The centre-right alliance, he claimed, would let them have a voice. Before the budget vote, Mr Lofven forlornly appealed to the alliance parties to avoid a crisis and reject support for their budget plans from the Sweden Democrats. But after a late-night meeting on December 2nd, they refused to negoti-

ate over a new budget.

Mr Lofven may go down as the shortest-lived elected prime minister in Swedish history, and his Social Democrats, already at an all-time low with the electorate, have lost more voter confidence. The larger questions are how much more the Sweden Democrats will transform a traditionally compromise-oriented political landscape and what happens if the March ballot produces a similar hung parliament. Mr Lofven seemed flummoxed by the far-right party's support for the alternative budget and by the alliance's unwillingness to negotiate, even though both had been well trailed. As a former trade unionist without political experience, he is used to consensus, not crisis.

But if Mr Lofven was surprised by the outcome, Sweden's election authority was not. Even as the politicians were arguing, it pragmatically ordered six million envelopes for paper ballots and began preparing for a new election. Swedish taxpayers will pay about 250m krona (\$33m) for the privilege of going to the polls again. ■

Dutch race relations

Blackened up

AMSTERDAM

A worsening clash over tradition and racial sensitivities

THE Dutch festival of Sinterklaas on December 5th, the country's most important children's holiday, is turning into an annual slugfest of racial politics. The problem is the figure of Zwarte Piet, an impish clown with a black face who accompanies the bearded St Nicholas ("Sinterklaas") on his rounds, distributing presents and biscuits. The character is derived from 17th-century paintings of Moorish slaves, and many Dutch with African ancestry find it offensive. Most white Dutch fail to see the problem, and react angrily to accusations that their tradition is racist. The conflict plays out in the media, the schools, the courts and at Sinterklaas parades around the country. And it has fed into culture wars between Dutch liberals and anti-immigration populists such as Geert Wilders.

Opponents of the tradition thought they had won a victory earlier this year, when a court ordered Amsterdam to bar Zwarte Piets from its Sinterklaas parade. But a higher court reversed that decision last month. Amsterdam, with its leftist politics and large immigrant population, has taken a conciliatory approach, ordering some Piets merely to smear their faces to suggest they have climbed down a chimney. (Many white Dutch use this just-so story to excuse the character's skin colour,

though it fails to explain his curly hair and thick, bright-red lips.) Other liberal Dutch are switching to multicoloured "rainbow Piets". But in most Dutch towns, Zwarte Piet remains thoroughly blacked-up. At a Sinterklaas parade in the town of Gouda, protests by anti-Zwarte Piet activists led to 90 arrests.

The sharpest twist in the debate this year came from a Dutch documentary

film-maker, Sunny Bergman. For her film "Our Colonial Hangover", broadcast on December 1st on national television, she dressed up as Zwarte Piet in East London, eliciting ridicule and anger from locals (including a flabbergasted Russell Brand). The film also stages an experiment in which three young men, one white, one black and one of Moroccan ethnicity, each nonchalantly try to smash a bicycle lock at midday in an Amsterdam park. Passers-by question the black and Arab men and phone the police; they assume the white man has simply lost his key. Park employees even help him to cut the chain.

In a bicycle-mad country, the experiment has struck a nerve. It has also moved the discussion to the larger question of racial prejudice in Dutch society. Other events have brought ethnic tensions to the fore. In September, prompted in part by worries over Dutch jihadists, Lodewijk Asscher, the deputy prime minister, announced heightened scrutiny of four Dutch Turkish organisations that he suspects hinder integration, including a religious group, Milli Gorus. Two Dutch Turkish MPs from Mr Asscher's Labour Party harshly criticised the move, and in mid-November the party expelled them. Turkey's foreign ministry then issued a statement of concern over anti-Turkish "racism" in the Netherlands. That prompted a testy exchange between Mark Rutte, the prime minister, and his Turkish counterpart, Recep Tayyip Erdogan.

All of this grumpiness highlights the difficulty centrist politicians are in. They find it impossible to address their non-white constituents' complaints over racism without angering Dutch whites who do not consider themselves racist. In the film, Mr Brand explains his shock at Zwarte Piet: "In this country we think of Holland as a very advanced nation, with advanced social principles." So do the Dutch, which is one reason they have such trouble accepting criticism of Zwarte Piet. ■



Who, us? Racist?

Charlemagne | Poland's progress

Donald Tusk's appointment caps Poland's journey to Europe's core



WHEN Poland joined the European Union in 2004, says Rafal Trzaskowski, its Europe minister, the old members feared it would be “as terrorising as Spain, as arrogant as France” and as keen on opt-outs as the British. Ten years later and they are more likely to come crawling for advice. Helped by large amounts of EU cash, Poland has become an economic and political role model for the rest of the club, growing by almost 50% over the decade and largely avoiding the lapses into populism or authoritarianism of some others. So it is fitting that this week Donald Tusk, who oversaw much of Poland's progress as prime minister between 2007 and 2014, should become the first politician from “new Europe” to move into one of the EU's top jobs. As president of the European Council, where Europe's heads of government meet, it will fall to Mr Tusk to craft deals between 28 disputatious leaders.

Poland is near the heart of many of the challenges facing the EU, from restarting growth to the Russian threat in Ukraine to the British problem. Some of this is circumstantial: Ukraine is Poland's neighbour, Britain the top destination for its migrant workers. But it also highlights the maturing of Polish diplomacy. In the early days Poland's posture was defensive or transactional, concerned with voting rights or the opening of foreign labour markets. That approach persists in occasional “zero-sum” distributional debates, such as those over the EU budget or climate-change policy, that tend to reinforce Europe's old west-east split. In both cases the Poles won reasonable deals, expanding the budget and gaining exemptions from climate rules.

Elsewhere the Poles have become skilled at wrapping diplomatic initiatives in European colours. The eastern partnership, an (ultimately doomed) attempt to bring the EU's eastern neighbours, such as Ukraine, into Europe's orbit without offering them membership, was the product of an odd but fruitful alliance between Poland and Sweden. More recently Poland's brainy finance minister, Mateusz Szczurek, has pushed a €700 billion (\$870 billion) investment plan as a much-needed fillip for Europe's struggling economies. Trouble abroad is trouble at home, Mr Szczurek notes: the rest of the EU buys 75% of Polish exports.

Poland has learned to move nimbly between different groupings on different issues. The “Visegrad” club (Poland, the Czech Republic, Hungary and Slovakia) is hopelessly split on Russia but

united on the need for more cash from Brussels. The “Weimar triangle” (France, Germany and Poland) brings the Poles into the orbit of the EU's traditional powerhouses, even if its heft is more symbolic than substantial. The relationship with Germany is particularly strong, and rests on two pillars: a shared dedication to fiscal stewardship, and the business ties that have turned Polish firms into important suppliers for German manufacturers.

Beyond the rapprochement with Germany, Poland's journey to Europe's core rests largely on its economic success. As ministers never tire of pointing out, Poland was the only EU country not to sink into recession during the financial crisis, an economic achievement from which the country has reaped endless political dividends. One former minister says that in 2007 her European colleagues paid her little heed during trips to Brussels; two years later they were scrambling for her opinions.

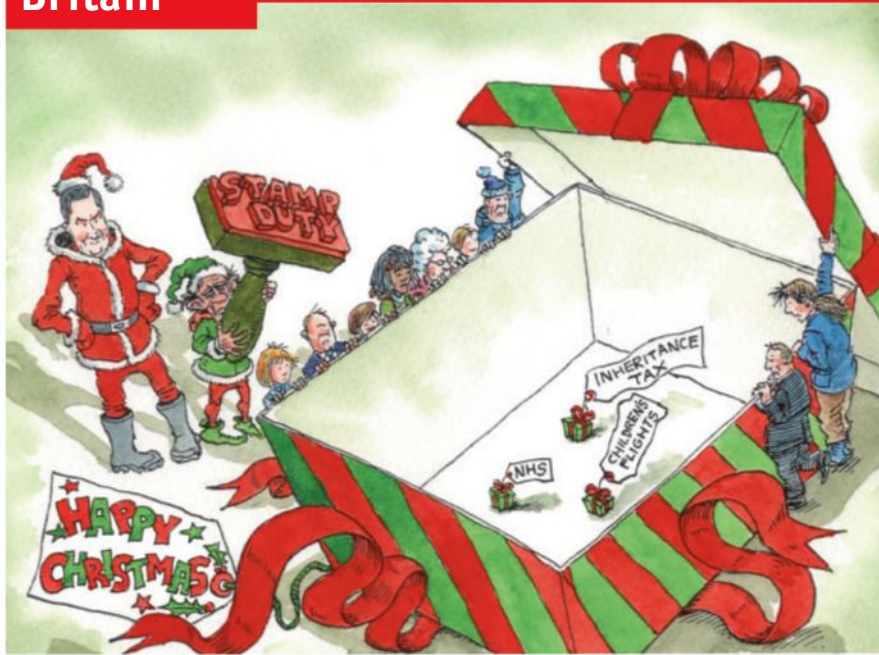
Yet despite the happy talk, Poland's hardest challenges may lie ahead, as a new paper from Piotr Buras, a Warsaw-based analyst at the European Council on Foreign Relations, argues. Since 2004 Poland has banked the easy economic and political wins, spending EU cash on infrastructure projects and reaping the diplomatic fruits of accession. It must now find a new growth model based on innovation rather than cheap labour, particularly as the geyser of EU money dries up. And as the euro zone integrates, the longer Poland hangs on to the zloty the further it may drift from the policy-making core. This is a concern for ministers, for among Polish voters the euro lacks friends.

Enter Tusk

As for Mr Tusk, his appointment tells a story not only about Poland but about the EU. He speaks fluent German but barely any French, unthinkable for a senior EU figure in the past. (His English is stronger, thanks to eight hours a day of homework in recent months.) He supports the euro but has struggled to win over voters. Despite Poland staying outside, he will chair eurogroup summits as well as European Councils, which will please those worried by the EU's divide between euro ins and outs. He also understands the Russian threat well. Indeed, it was the Ukraine crisis that persuaded him to take the job; just days before the decision in August he was fretting about abandoning his Civic Platform party a year before an election. (He needn't have worried: the party has bounced in the polls since he left.)

Mr Tusk's modest predecessor, Herman Van Rompuy, served as a sort of therapist to the EU's leaders, listening to their concerns and finding common ground where it was available, particularly on economic matters. A different approach may be expected from Mr Tusk, who elbowed his way to the top of Polish politics, sometimes ruthlessly. When appropriate he is likely to make his own views clear, especially on foreign affairs (even if he chooses to leave Europe's southern neighbourhood largely to the EU's foreign-policy chief, Federica Mogherini). As a veteran of the anti-communist struggle he can speak authoritatively on the European aspirations of countries like Ukraine.

Yet for all that, Mr Tusk's tools will be the multilateral ones of a committed European. In particular, look to his plan for an “energy union,” which he hopes will weaken Russia's ability to play divide and rule among its European customers by creating a single buyer for Gazprom's supplies. The proposal was a Polish one but would redound to Europe's advantage. That seems fitting. ■



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The autumn statement

'Tis not the season

George Osborne makes up for a lack of giveaways with bold tax reform

FIVE months before an election, the chancellor of the exchequer might be expected to play Father Christmas, doling out gifts in an attempt to win favour with the electorate. When George Osborne delivered Britain's annual mini-budget, the autumn statement, on December 3rd there was no such largesse. New spending commitments were minimal because Britain's deficit—which totals 5% of GDP—remains a bind. But the Conservative chancellor still managed to produce a few surprises, including a significant reform to the taxation of property purchases.

As expected, Mr Osborne announced yet another missed deficit-reduction target.

Despite strong growth—likely to be 3% this year—the Office for Budget Responsibility (OBR), Britain's fiscal watchdog, says borrowing will be £91 billion (\$143 billion) in 2014-15, £5 billion higher than forecast in March. Luckily for Mr Osborne, this still represents a slight fall on last year, sparing him the embarrassment of the deficit widening on his watch, even if underlying borrowing, which strips out short-term economic fluctuations, will rise.

The primary cause of the increase in borrowing is a similarly-sized undershooting of income-tax receipts, which have disappointed recently (see chart 1). A result of a low-wage recovery combined with tax cuts for low earners, this shortfall looks worryingly durable. Yet the chancellor argues that lower government spending should put him back on track by 2016-17.

Mr Osborne's main boast is that he has a firm grip on spending. That is in fact partly the result of low interest rates, which are reducing the cost of servicing Britain's hefty government debt. Yet strong job creation, for which Mr Osborne can take some credit, is bringing down the welfare bill. Assuming that growth continues and the stringent further cuts Mr Osborne is plotting come to pass, the OBR predicts that, by 2018-19, spending will be £26 billion less than it had expected.

But those assumptions may be wrong. Departmental budgets have been agreed

only until 2015-16, and the next government might not stick to Mr Osborne's plans. Even if the Tories win again, it will require deeper cuts than voters are prepared for. Mr Osborne replies that no one expected this government's cuts to pass as easily as they have.

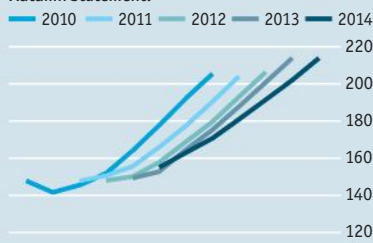
According to the OBR's forecast, government spending will fall from 41% of GDP today to 35% of GDP by 2019-20. Given that the health, schools, and international aid budgets are ring-fenced, that would suggest a looming massacre of the unprotected budgets for welfare, local government and defence. The forecast requires day-to-day departmental spending—which does not include welfare—to fall from £147 billion today to £86 billion in 2019-20.

So Mr Osborne, the architect of this bloodletting, had no room for pricey giveaways. Instead, he actually tightened the purse-strings in his mini-budget, which involved additional small cuts to the armed forces, justice department, and the fire-service, disguised as a change to pensions. His big surprise was a reform to stamp duty, a ▶▶

In the distance

Net income-tax receipts*, £bn
Actual and forecast

Autumn Statement:



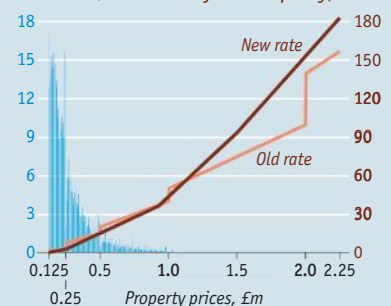
Source: OBR

*Adjusted for tax credits

Less kinky

Property transactions
Jan-Oct 2014, '000

Revenue per transaction
from stamp duty, £'000



Sources: OBR; Land Registry

▶ tax on property purchases.

Previously, stamp duty operated under a “slab” system. More expensive properties attracted a higher rate, but on the property’s entire value. The resulting thresholds meant paying just a pound more for a house could attract a tax bill several thousands pounds greater. Inevitably, prices clustered just below such points.

These inefficiencies will now be rectified: higher rates will bite only incrementally (see chart 2 on previous page). Taxes will be lowered for 98% of homebuyers. House prices might rise slightly, but the effect will be small, reckons Lucian Cook of Savills, a real-estate company.

For some of the remaining 2%, tax increases will be eye-watering. Anyone buying a £5m house will have rushed to exchange in the hours following the statement; the tax bill on such a transaction will now soar by 47%—from £350,000 to £514,000.

This was good politics. The opposition Labour Party wants an annual levy on homes worth over £2m. But given the hefty tax bill that will now come with acquiring such a house, this plan looks excessive.

The Treasury reckons the reform to stamp duty will cost about £800m annually. The biggest countervailing contribution to the coffers comes from bank taxes. Like all businesses, banks can use past losses to offset profits, reducing their corporation-tax bills. Many people see this as unjust, since bank losses during the financial crisis were often borne by taxpayers. Now, such relief will be limited to half of a bank’s profits in any one year. In the long-run, this won’t change much; banks will still be able to offset all their losses eventually. But they must do so more slowly, increasing the Treasury’s receipts in the short-term.

There were some small giveaways, including tax cuts for children’s flights, inherited savings accounts, orchestras, and children’s television. A new tax on profits earned in Britain but sent overseas, aimed at corporate-tax avoidance, should also play well with the public. Some see these changes as boondoggles. Professor Philip Booth of the Institute of Economic Affairs, a free-market think-tank, bemoans the added complexity introduced to the tax system and calls for the autumn statement to be abolished so that future chancellors desist from such tinkering.

That is unlikely to happen. The mini-budget has allowed Mr Osborne to outmanoeuvre his opponents. His stamp-duty reforms have been welcomed and few will oppose his banker-bashing. If the real test of the statement—the additional pledge to slash public spending—is yet to come, that will not bother Mr Osborne this side of the election. His reputation for toughness has given him and his party credibility with voters. The mini-budget was designed to remind them of that. ■



New homes

Building blocks

BICESTER

The government makes a lame attempt to boost house-building

AS GEORGE OSBORNE prepared to deliver his autumn statement, on December 2nd, Danny Alexander, his Liberal Democrat deputy at the Treasury, announced a slew of investments in infrastructure. These included a much-needed £15 billion (\$24 billion) for roads, as well as £2.3 billion for flood defences. Mr Alexander tried to make much of the coalition’s plans on housing, too, trumpeting 13,000 new homes to be built at Bicester, a town in Oxfordshire, which would then be designated as a garden city. The government will need to do much more, however, to solve Britain’s housing problem.

On average, 140,000 homes have been built in each of the past four years, far fewer than the 240,000 new houses needed annually. With supply constrained, house

prices continue to rise, by 19% in London over the past year. There is an estimated deficit of as many as 1m houses.

Bicester is in the arc north and west of London’s green belt that is ideal territory for more house-building: it is good for commuters to the capital and other hubs of employment such as Oxford and Cambridge. It is the arc where, after the second world war, the government built several garden cities—new towns that combined employment with a pleasant place to live. Bicester has good transport links and plenty of brownfield land (most of the new homes will be on land now owned by the defence ministry). It also has an MP who supports more construction.

Yet the Bicester houses are “not even a drop in the ocean,” says Paul Cheshire of the London School of Economics. The politicians are just going through the motions, he says. “This is political window dressing.” And that is assuming the homes even get built. Construction at the other recent attempt to fashion a new garden city—in Ebbsfleet, south-east of London—has barely begun.

Locals in Bicester are not pleased, either, raising familiar concerns about crowded schools, bad traffic and stretched health care. “We don’t even have a proper hospital,” says Claire, a hairdresser. “How are we going to support 13,000 more homes?”

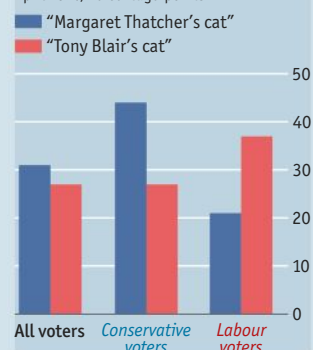
Meanwhile, Mr Alexander suggested another solution to the lack of housing: the first government involvement in house-building in a generation. He announced a pilot scheme near Cambridge to build 10,000 new homes, warning developers, “If you don’t build, we will.”

The answer is simpler, says Mr Cheshire: the government should amend planning regulations to allow construction on the green belt. “Nothing short of radical” solutions will solve the problem, he says. But the benefits of such changes take a long time to filter through. The drawbacks for NIMBYS are apparent immediately, especially just ahead of an election. ■

Maggie’s moggy and Tony’s tabby

What do prime ministerial pets teach us about politics? “Sex, Lies and the Ballot Box”, a new book edited by Philip Cowley and Robert Ford, two political scientists, contains some revealing polling. Shown a photo of Humphrey the cat, chief mouser at Downing Street over three premierships, voters reacted differently depending on the reported identity of his owner. Conservatives preferred “Margaret Thatcher’s cat”; Labour ones liked him better if they were told that he belonged to Tony Blair. (American researchers found those hostile to Barack Obama disliked his dog, too.) As Mr Ford puts it, voters lean on things they do know when deciding about things they do not. Bad news for unpopular politicians with great new policies.

Net approval rating of prime minister’s cat
April 2014, Percentage-points



Source: Robert Ford, YouGov

Bagehot | A fairly useful prime minister

In difficult times, David Cameron has impressed Britons, without ever enthusing them



IN WINTRY light, sodden Oxfordshire fields flash by the train window, dampening Bagehot's spirits. Seated on the cramped and stained seat opposite, David Cameron meanwhile exudes his characteristic chipperness. Beaming at the lady who offers him coffee, nodding languidly at the red briefcase containing the afternoon's business, the Conservative prime minister's calm and officer-like good humour is evident in everything he does. It is his greatest strength as a leader. In all the mini-crises that have punctuated his premiership, only the near-miss of Scotland's independence referendum is said to have unnerved him much.

He also has a new reason for cheer. Long-awaited and potentially perilous, the speech Mr Cameron delivered on immigration on November 28th went as well as he could have hoped. In the run-up he had dangled his legs over a precipice, by mulling curbs on European migration clearly incompatible with Britain's EU membership. In the event, he left one leg dangling, by proposing discriminatory new welfare rules for European immigrants, yet the overall impression was of moderation. "Look, we've got a fantastic, multiracial democracy based on opportunity and meritocracy, a really precious thing," he says. "But you don't serve the principle of being an open economy by saying we're going to be so open we're going to ignore people's concerns."

As for the trailing leg, Mr Cameron does not dispute that the renegotiation of Britain's EU membership he has proposed would now be dominated by immigration. But he disagrees with Bagehot's suggestion that the "In-Out" referendum he has also promised, assuming the Tories win re-election in May, would also be. "When you ask people to vote on a real issue, they vote on that issue: the Scotland vote wasn't about the NHS but about whether Scotland wanted to stay in the United Kingdom," he says. Other European leaders, though not pleased by Mr Cameron's latest demand, do seem relieved by its unpredicted modesty. Strangely, their nemesis, the Tory Eurosceptics who want tougher curbs, are also calm. Between the European devil and the deep blue Tory sea, Mr Cameron may just have wriggled free.

With the election looming, he hopes to have cleared the decks for a fight on his preferred terms—the economy and leadership, on which the Tories enjoy big leads over the Labour Party. In previous elections, this would almost have guaranteed Mr Cameron

the majority he failed to secure in 2010. The coming election looks different. To win a majority, the Tories need around 40% of the popular vote, and they are stuck in the low 30s, suggesting the golden thread between the Tories' twin strengths and electoral reward has been severed. Or, to put it another way, that Mr Cameron's leadership is admired but insufficient. Why is that?

The obvious explanations are structural—being rooted in the economic malaise and anti-establishment sentiment evident across the Western world. Despite 18 months of strong economic growth, British wages are languishing at below pre-financial-crash levels. That has fuelled a sense of dissonance between household and national fortunes which connects to the wider disaffection. It is partly long-standing, having to do with shrunk-en institutions and the end of class-based deference, yet hugely exacerbated by the crash. The result, in Britain as across Europe, is a collapse in support for mainstream parties and the rise of populist insurgents—including Mr Cameron's main bugbear, the UK Independence Party, which has stolen a majority-making share of the Tory vote. Its success in railing against immigration is the main explanation for Mr Cameron's sensitivity to the issue. He protests that he "genuinely cares" about it. Who says he didn't?

If this fragmentation is everywhere enfeebling to governments, in Britain—with its traditional two-party system, majoritarianism and, at the apex, all-powerful prime minister—the effect is traumatic. The worries about presidential government that attended Tony Blair's thumping majorities—the last secured in 2005—now seem like the naive cares of a distant age. Constrained by coalition rule—which Mr Cameron, to his credit, remains more positive about than most Tories—massive public debt, a rebellious party and the devolution that Mr Blair set in motion, he has occupied an office vastly diminished. Sometimes, to his cost, he has seemed to forget this. Thus the hubris he displayed in failing to win parliamentary support for air strikes on Syria; as a result, he has all but forfeited the prime minister's centuries-old right to order the country to war. Thus his rashness in allowing Scotland's nationalists to set the terms of a referendum which was the most dramatic event of his premiership, and in which Mr Cameron was a virtual bystander. Thus, too, it may prove, his willingness to commit Britain's EU membership to a referendum on an assumption that good sense and his own powers of persuasion can preserve the status quo. The mismatch between Mr Cameron's strong personal ratings and his uncertain prospects does not support that view.

Is this the best there is?

There is, to be fair, more to be said in his defence, starting with the fact that it is hard to see anyone in Westminster obviously more up to his job. In its effort to peg back the spoiling, unaffordable welfare system bequeathed by Gordon Brown, Mr Cameron's predecessor, who announced his retirement from Parliament on December 1st, his government has also performed a critical service. Its education reforms are bold and promising. In introducing gay marriage and smoothing adoptions, its social record reflects Mr Cameron's liberal instincts, not his party's nastier edge. His government has also shown that coalition rule, which Britons should get used to, works pretty well. That is a lot. Yet when the record of this strange, turbulent period in British politics is written, it will describe a Tory prime minister who rode the tempest, but could not make the weather. If that is the best Westminster can offer, it is disappointing. ■



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International justice

Nice idea, now make it work

THE HAGUE

The International Criminal Court is struggling to justify itself amid accusations of bias against Africa

EXPECT righteous indignation, laced with racial animosity, at the week-long annual deliberations of the International Criminal Court (ICC) that kick off in New York on December 8th. A growing number of African leaders say they have lost faith in the court because all those it is currently trying are African. Some blame a “cabal” of wicked Western powers. A few have even threatened to walk away.

They are unlikely to go so far. But if they did, it would badly weaken the court’s *raison d’être*, which is to strip impunity from those who commit war crimes, genocide and crimes against humanity. Irrespective of charges of anti-African bias, detractors say it has not repaid the effort of creating it 12 years ago, or the cost of running it. At next week’s meeting its administrators will ask for a budget for 2015 of €135.4m (\$167m), 11% higher than this year’s figure. So far it has convicted just two villains, both Congolese warlords.

African leaders, anguished by the Rwandan genocide in 1994 and the unpunished evils of apartheid, were originally among those keenest on the ICC. Of the 139 countries that have signed its founding Rome statute, 34 are African. But Africa’s support began to waver in 2006, when the court looked into atrocities in Sudan’s Darfur region and, three years later, issued a warrant for the arrest of Sudan’s president, Omar al-Bashir, charging him with genocide, among other crimes.

The case against Uhuru Kenyatta, Kenya’s president, has resulted in support wobbling still more. Mr Kenyatta was accused, with others, of orchestrating post-election violence in 2007 which left at least 1,300 people dead and perhaps half a million homeless. His trial, years in preparation, has been postponed at the request of the chief prosecutor, Fatou Bensouda (pictured above). Kenya’s government has been accused of failing to co-operate, allowing witnesses to be bribed and intimidated, and refusing to provide tax returns, bank statements and mobile-phone records which could support allegations that the president paid people to clobber followers of a rival party after the poll.

But on December 3rd the court’s judges told Ms Bensouda that unless she finds harder evidence within a week, she must drop the charges. Her request for an indefinite postponement is now unlikely to be granted. Nor, it seems, will a definitive finding of “non-compliance” be issued against the Kenyan government. The case has plainly dented the court’s credibility.

Still, South Africa and Nigeria have not wavered in their general support. Nor have African human-rights lobbies or lawyers’ groups. But Mr Kenyatta has stirred up an array of fellow African leaders, some of whom insist that sitting rulers should have immunity. He has dubbed the court a “toy of declining imperialist powers”, pointing jeeringly at Britain, which once locked up

his late father Jomo, Kenya’s founding president. It “must unshackle itself from a pernicious group of countries that have hijacked its operational mandate” with an agenda that has been “shameless, disruptive and unrelenting”, says Kenya’s man at the UN.

The fact that all the cases being tried before the ICC are African is bound to lay it open to the charge of bias. “Kenya’s case has overshadowed everything,” says a Nordic diplomat involved in trying to make the court more credible and effective. “[The court’s] biggest challenge is how to get out of Africa,” says Guénaél Mettraux, a Swiss defence lawyer in several big cases.

But not all the court’s problems are African. The refusal of many of the world’s beefiest countries to sign up also damages its reputation. Although all of Europe and South America have joined, America, China, India and Russia have not—though Barack Obama is not as hostile as was his predecessor, George Bush.

Ms Bensouda and her colleagues are fighting back against the court’s critics. They point out that, although all eight sets of cases in progress are African, five were initiated by African governments themselves, and two (concerning Sudan and Libya) were referred to the court by the UN Security Council. The Kenyan cases were agreed to by Kenya’s government of the day, at the urging of the UN’s former head, Kofi Annan, a Ghanaian, who had mediated an end to Kenya’s post-election chaos. As for the charge that the court is run by white imperialists, its president is South Korean. The chief prosecutor is Gambian. The main director in her office is from Lesotho. And Sidiki Kaba, who is to be endorsed as president of the assembly of member countries that will gather on December 8th, is Senegal’s justice minister.

Several investigations are under way ►►

▶ outside Africa, too. They include cases in Afghanistan, Colombia, Georgia and Honduras, as well as Iraq, where allegations against British soldiers are being examined with the co-operation of the British government. It seems increasingly likely that Palestine, thanks to its advance towards statehood within the UN, will refer Israel's settlements on the West Bank and military actions in Gaza to the court—which could mean that Hamas, the Palestinian Islamist movement, also comes under scrutiny for firing rockets indiscriminately at Israeli civilians. And Ukraine, though not a signatory, has accepted the court's jurisdiction to investigate crimes alleged to have been committed on its territory.

Tortoise beats hare

What the court most needs are patience and more realistic expectations. Ms Bensouda may provide both. Whereas her predecessor, Luis Moreno Ocampo, put the court on the map but was accused of rushing into cases too fast, she builds diplomatic bridges and gathers hard evidence before issuing warrants, now tallying around 30 since the court's inception. "People never believed we'd get [Radovan] Karadzic," says a judge on the special tribunal for former Yugoslavia which preceded the ICC (and has secured 74 convictions). The Bosnian Serb was caught and brought to The Hague 13 years after his indictment; the verdict against him is expected soon.

But the old argument between those who think justice should supersede peace and those who fret that an insistence on justice can impede peace is unresolved. The UN Security Council can ask the court to halt proceedings for a year, which can be extended, if it thinks peace negotiations may be ruined by a party being summoned to the dock. Talks between Colombia's government and the FARC, a guerrilla group, are a case in point. And the ICC is a court of last resort. If a signatory state—for instance, Britain in the case of Iraq—is willing and able to bring its own people (including members of its government) to book, the court will step aside after a preliminary investigation.

The ICC may have been guilty of idealistic overreach in its first decade. Perhaps it was naive to expect the likes of Mr Kenyatta to co-operate by putting their own heads on the block. And ugly bargains between bloodstained leaders may be deemed necessary to end strife. "Justice does not lead, it follows," writes Jack Snyder, a professor at Columbia University who has been sceptical about the ICC.

Nonetheless, the notion that no perpetrator of mass atrocities can count on perpetual impunity surely deserves a cheer. Special tribunals for Yugoslavia, Rwanda and Sierra Leone paved the way. As a work in progress, the ICC has been moving glacially—but in the right direction. ■

Climate diplomacy

Flexible or toothless?

LIMA

Turning promises to cut emissions into a binding global deal

TO GET to the tent city in the grounds of Peru's defence ministry, where UN climate talks are being held between December 1st and 12th, delegates and hangers-on must pass an assault course. Its obstacles of steep walls, ropes across ditches and parallel bars, normally used by soldiers, are a reminder of the difficulties that negotiators face if they are to forge a new treaty in Paris in a year's time to avert destructive climate change. If the Paris meeting is to succeed, the Lima get-together—officially the 20th Conference of the Parties to the UN Framework Convention on Climate Change—must agree on crucial preparatory steps. Morale is higher than it was a year ago. But it needs to be.

The objective is to ensure that global temperatures do not rise by more than 2°C compared with pre-industrial levels through a legally binding international treaty that curbs greenhouse-gas emissions. This would replace the Kyoto protocol, which came into force in 2005, when it finally lapses in 2020. Countries have agreed to give themselves until the end of March to propose commitments to cut emissions from 2020 onwards that are known by the ugly term "intended nationally determined contributions" (INDCs).

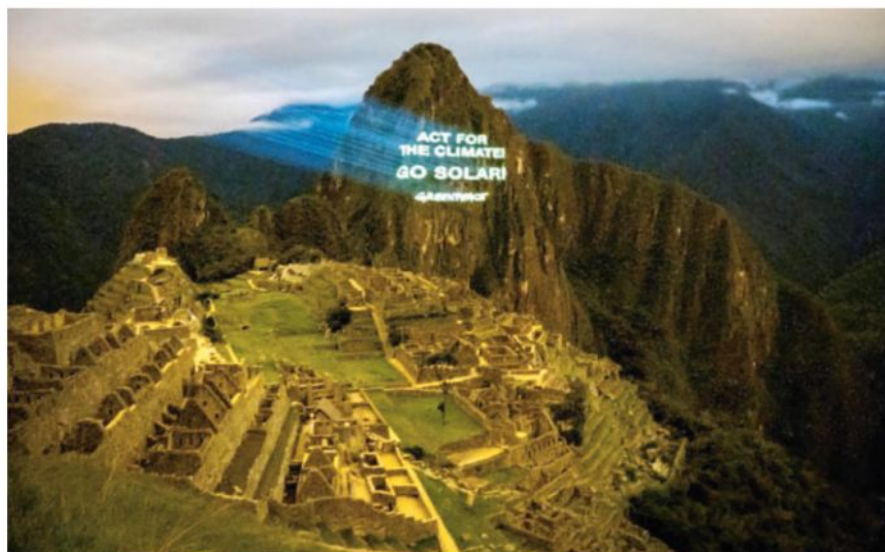
The process has acquired unexpected momentum. In October the European Union announced plans to cut emissions by 40% from 1990 levels by 2030. Scores of cities and multinational companies have made new commitments to curb emis-

sions and adopt low-carbon technologies. Governments have pledged \$9.3 billion to a new Green Climate Fund, intended to help poor countries cut emissions and adapt to the impact of climate change on their societies and economies. Most surprising were the announcements in Beijing last month by Barack Obama that America would cut its emissions from 2005 levels by up to 28% by 2025, and by Xi Jinping that China's emissions would reach a peak around 2030.

Vague though Mr Xi's commitment is, it broke the rigid division enshrined in the Kyoto protocol under which only developed countries are obliged to cut emissions because of their historic responsibility for the greenhouse gases already in the atmosphere. It thus puts pressure on countries such as India and Brazil to follow suit. Similarly, Mr Obama's pledge leaves those governments sceptical of climate change, including Australia's, Canada's and Russia's, more isolated.

The task facing the climate diplomats in Lima is to inject this renewed momentum into the negotiations. They must condense a loose 22-page draft of the text of a new treaty into a tight and workable document of ten pages or so, which has to be finalised by June. In particular, the Lima meeting must devise a formula to make INDCs "clear, open and compatible" in order to hold countries accountable, says a European Union official. It must also discuss how to scale up the Green Climate Fund to meet a target budget of \$100 billion a year by 2020. And it is meant to co-ordinate action on high-impact measures, such as forest preservation, between now and then.

Poorer countries insist the process will lose legitimacy unless rich countries commit more money and technical co-operation to help them adapt to climate change. A group of African countries said this week that mitigation (ie, emissions cuts) and ad- ▶▶



Machu Picchu welcomes the sun

► aptation should have “material and legal parity” in the new treaty.

That is because few expect the INDCs, when totted up, to be ambitious enough. The UN Environment Programme reported last month that to avoid a 2°C increase in temperature—the level above which scientists believe catastrophic damage could occur—global emissions must peak within the next ten years and fall to half their current level by 2050. So the treaty has to be “dynamic”: in other words, able to accommodate strengthened commitments in future, according to the EU official. That may help defuse the argument about whether the INDC targets should be legally binding, as Europe wants but America does not.

Many obstacles remain to effective global action to curb rising temperatures. They include the recent steep fall in oil

prices, which weakens the appeal of renewable energy, and the capture of America’s Congress by the Republicans, who do not share Mr Obama’s commitment to climate action.

On the other hand, the negotiators have learned from the failure of the most recent attempt to agree a global treaty, in Copenhagen in 2009. That became a last-minute diplomatic poker game. The approach now is to put some cards on the table in advance, trying to build a flexible treaty based on known commitments, which should be more politically viable. According to Andrew Steer of the World Resources Institute, a Washington-based NGO, “there’s now a much greater recognition that actually there are many paths to get to where we need to get to.” In Lima the world must start taking them. ■

Bribery

Graft work

A new study lights up the shadows

GONE are the days when multinationals could book bribes paid in far-flung countries as a tax-deductible expense. These days would-be palm-greasers have to contend with ever-tougher enforcement of old laws, such as America’s Foreign Corrupt Practices Act of 1977, and a raft of new ones in countries from Britain to Brazil.

As policing is stepped up, however, much about the practice of bribery remains murky. The OECD’s first report on the subject, published on December 2nd, sheds some light by analysing more than 400 international bribery cases that have been brought since the anti-bribery convention of this group of mostly rich countries came into force in 1999.

Some findings confirm what was known or suspected. The most bribe-riddled sectors are oil, gas, mining, construction and transport. At the other end of the spectrum, financial services and retailing are fairly clean. Most bribes go to managers of state-owned companies, followed by customs officials. And America leads the enforcement pack, with 128 cases that resulted in sanctions (see chart).

But the report also undermines some common beliefs. Bribery is not a sin of rogue employees or poor countries. In 53% of cases payments were made or authorised by corporate managers (and in 12% of them by the chief executive). More than 40% of the time, the bribe-taking official was in a developed country (though this figure is probably inflated by rich countries’ greater willingness to criminalise

bribery and co-operate with cross-border investigations). Authorities are often alerted by firms themselves: those that co-operate quickly are often treated leniently.

Nevertheless, the cleanest countries tend to be rich, and the dirtiest poor. Four of the five best-performing countries in Transparency International’s latest corruption-perceptions index, also published this week, were Nordic. The worst were North Korea and Somalia. (Interestingly, China’s score slipped despite a recent high-profile campaign against corrupt officials.)

The cost of bribery varies by industry. Builders pay a modest average of 4% of a transaction’s value, extractive companies a hefty 21%. Add to that the rising costs of

paying penalties and conducting internal probes—these cost Siemens, for example, \$2.4 billion when it was mired in a graft scandal a few years ago—and bribery starts to look bad not just for reputations, but also for bottom lines.

Even for firms that are not caught, the business case for bribery is far from clear. A 2013 study by Harvard Business School and America’s National Bureau of Economic Research found that what bribe-paying companies gain in higher sales in corrupt countries, they lose in lower profit margins. According to the OECD, the average bribe costs 11% of the transaction’s value and 35% of associated profits.

Nevertheless, graft remains alive and well. One of the OECD report’s authors told a conference this week that 390 cases are under investigation—not far short of the total number resolved since the OECD convention took effect 15 years ago. The number of cases concluded each year has dipped since a peak in 2011 as the time taken to complete investigations and prosecutions has climbed to more than seven years, from under four in 2008.

One possible reason for the slowdown is that bribery techniques are growing more sophisticated and thus harder to detect. Another could be the widespread use of opaque corporate structures to conceal wrongdoing. These can be devilishly difficult to unpick, especially when they are stacked in several layers and fronted by nominee directors. Anonymous shell companies and other intermediaries—sometimes dressed up as “consultants”—were used to move or to house payments in more than 70% of cases. The OECD report underlines the importance of cracking down on the misuse of shell companies and enforcing more clarity over ownership of companies and trusts, whether through accessible corporate registers—a move being pushed by some G20 countries, led by Britain—or by tougher regulation of service providers that do the paperwork for new firms. ■

Bad bargains

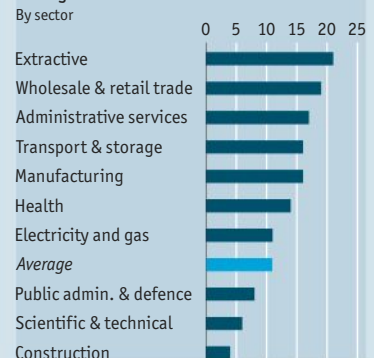
Foreign bribery, 1999-2014

Enforcement actions resulting in sanctions



Source: OECD

Average bribe as % of total transaction value

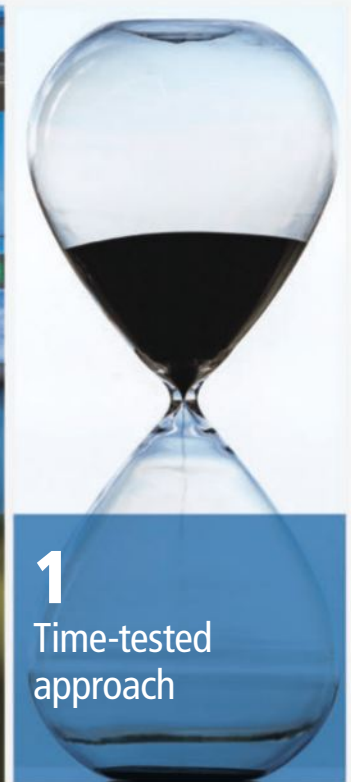
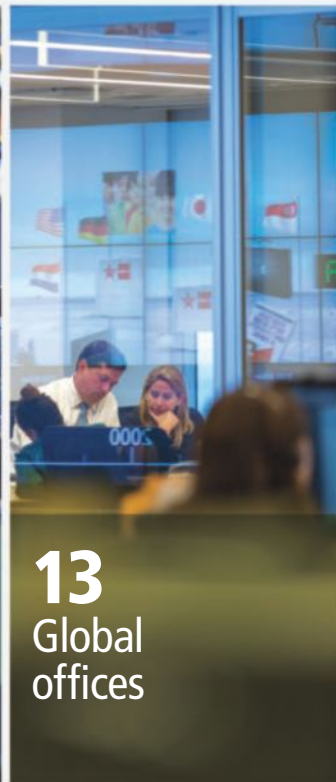
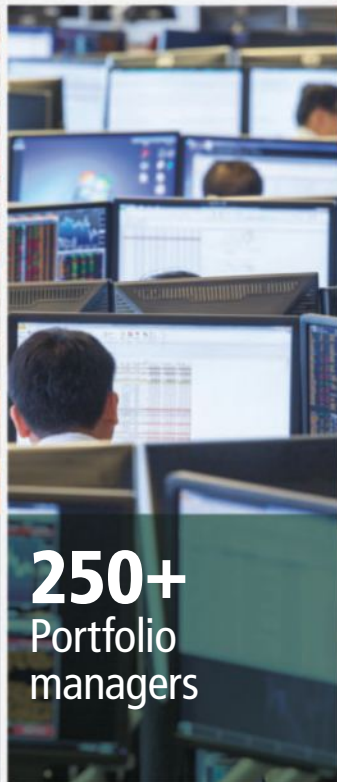


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Nuclear power in China

Promethean perils

SHANGHAI

After a hiatus, nuclear power is set for a revival in China

AFICIONADOS of fission have had to wait nearly two decades for another public flotation of a firm operating nuclear power plants. The last one, that of British Energy, was back in 1996, and that troubled company has since been taken over. Now investors have the chance to get in on the action in the hottest place in the global nuclear business: China.

China General Nuclear Power (CGN), a state-owned enterprise (SOE) that is the country's largest nuclear firm, is planning to float shares on the Hong Kong stock exchange on December 10th. Market rumours suggest it will raise well over \$3 billion. Dealogic, a research firm, reckons this is likely to be the biggest listing in Hong Kong as well as the largest utility IPO globally so far this year.

Some see in the flotation a harbinger of a nuclear renaissance. If true, this would bring cheer to a gloomy industry. The shale-gas revolution has undercut the economics of building new nuclear reactors in North America. And since the deadly tsunami and nuclear fiasco at the Fukushima site in Japan nearly four years ago, confidence in this technology has waned in many places. Germany, for example, is getting out of nuclear power (see next article).

China put a moratorium on new plants

after that accident too, but the boosters have now prevailed over the doubters. The State Council, the country's ruling body, wants a big expansion of nuclear power along the country's coast to triple capacity by 2020 (see map). This plan is not as ambitious as before Fukushima, but Moody's, a credit-ratings agency, nevertheless calls it an "aggressive nuclear expansion". Some analysts look beyond 2020 and predict an even bigger wave of nuclear power plants will be built in inland provinces, giving a boost to this type of energy worldwide.

Such forecasts should be taken with a big pinch of salt. It is true that China is the brightest spot in the global nuclear industry, but that is mostly because prospects in other places are bleak. It is also true that China's need to tackle pollution and desire to curb carbon emissions will give nuclear power a boost, but these factors also favour rival clean-energy technologies. In short, today's nuclear revival may well not live up to investors' lofty expectations.

One factor that could slow growth is cost. In the past Chinese governments were happy to throw endless pots of money at favoured state firms in industries deemed "strategic". Times are changing, however. Economic growth is slowing, and the government must now deal with

massive debts left over from previous investment binges. Since the export-oriented and investment-led model of growth is sputtering, officials may soon be keen to boost domestic consumption rather than merely shovel subsidised capital at big investment projects.

And it is not just that China may—and should—be starting to pay attention to the true cost of infrastructure projects. Rapid technological advances are also making low-carbon alternatives to nuclear power appear more attractive. Bloomberg New Energy Finance, an industry publisher, forecasts that onshore wind will be the cheapest way to make electricity in the country by 2030. Though coal will remain China's leading fuel for some time, Bloomberg's analysts think that renewables could produce three times as much power as nuclear in the country by that year.

What is more, as a latecomer, China had the chance to standardise designs of new nuclear plants to gain economies of scale and minimise risk. But rather than build copies of safe and proven designs from Westinghouse of America or Areva of France, it is insisting on "indigenisation". This approach is in line with China's desire to create national champions in key industries, as it has in high-speed rail. ▶▶

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Chinese nuclear designs could in theory be sold globally at some point, but this approach introduces needless variability and complexity. Some in the government pushed for selecting just one “indigenised” design—but turf battles seem to be preventing this too. China National Nuclear Corporation (CNNC), another big nuclear SOE which itself is hoping to do an IPO in Shanghai next year, and CGN are now championing different approaches.

Another drag on growth could be nagging doubts about safety. Philippe Jamet, a French nuclear safety commissioner, told his country’s parliament earlier this year that Chinese counterparts were “overwhelmed”. Wang Yi of the Chinese Academy of Social Sciences, an expert body, has warned that there are indeed “uncertainties” in the approach to nuclear safety.

Communist leaders would like nothing better than to replace filthy coal with carbon-free nuclear power. Yet they are also keenly aware that a big nuclear accident would prompt an ugly—and, in the age of viral social media, nerve-wrackingly unpredictable—public backlash against the ruling party. So leaders may well scale back aggressive growth plans if they find out that the country is unable to regulate, manage and staff nuclear plants properly.

A word of warning comes from the man who matters most. President Xi Jinping, speaking at a nuclear-security summit in the Netherlands earlier this year, likened the technology to the gift of fire granted by Prometheus to humanity. It can bring great benefits, he said, but without proper safeguards “such a bright future will be overshadowed by dark clouds or even ruined by resulting disasters.” ■

German utilities

E.ON and E.OUT

BERLIN

A German power-producer is breaking itself up to face the future

FOR many Germans, E.ON, the country’s biggest utility, is a symbol of stability. But on November 30th it surprised by announcing it would split itself up. In 2016 it will float a new company which will include its power generation from nuclear and fossil fuels, as well as fossil-fuel exploration and production. The rump—which will keep the E.ON brand—will make money from renewable energy, distribution and “customer solutions”, a grab-bag of offerings such as advice, smart-metering and the like. The firm’s boss, Johannes Teyssen, said that as a sprawling integrated utility E.ON could only be “mediocre”. Two focused ones would do a much better job.



Spot the nuclear off switch

Germany’s *Energiewende*, or “energy transition”, has hammered the country’s utilities. The government aims to shut down all nuclear plants by 2022, a decision made after the Fukushima disaster in Japan. Renewable energies, on the other hand, are heavily subsidised. Operators are paid well above market rates for each kilowatt-hour of power they feed into the system, and renewables are given priority on the grid over conventional sources. This policy has caused a stampede into renewables, with the ever-growing subsidies funded by ever-rising surcharges on electricity bills.

The *Energiewende* came at the worst possible time for the big incumbents, including E.ON as well as RWE, ENBW and Vattenfall (a Swedish firm with German operations). They had invested heavily in conventional generation before the renewables rush began. The resulting overcapacity has caused wholesale electricity prices to tumble. Some conventional plants cannot make enough money to cover fuel costs and are being shut down.

Many observers took E.ON’s decision to have off the fossil-fuel and nuclear-generation business as the creation of a kind of “bad utility”—like the “bad banks” created to house toxic assets after the financial crisis. The editor of *Handelsblatt*, a German business daily, wrote that E.ON would be “looking for investors who haven’t read a newspaper since the *Energiewende* began” to buy shares in the new firm.

But some analysts think that cynics have it wrong. Rejecting the “bad-bank” analogy, they note that the new firm will be born debt-free and have provisions to cover the exit from nuclear power (currently €14.5 billion, or \$18 billion). Shareholders could expect respectable cash dividends, paid for by profitable operations, even as net profits look bad.

And the hostile regulatory environment is not the only reason for E.ON’s planned split. Like many other industries,

the energy sector is becoming more decentralised and making more use of data. Big engineering firms such as General Electric and Siemens are investing to make distribution grids smarter. On December 2nd, Enernoc, which pays consumers to curb their electricity use, announced that it had bought Pulse Energy, a Canadian startup that sifts through consumption data to help businesses save power.

Mr Teyssen, for his part, cites Google’s purchase of Nest Labs, a maker of thermostats that are connected to the internet, as an example for the new world of energy management which E.ON wants to be a part of. It intends to help a Bavarian farmer, say, store excess solar power in the battery of his electric BMW and sell it back to the grid when prices are high, or switch on the washing machine at night when power prices are low.

E.ON’s spin-off may also have life in it. Germany cannot quit nuclear power while making a pell-mell exit from fossil fuels. Its government has still not come to terms with the conflicting goals of the *Energiewende*. Stable, cheap and climate-friendly energy supplies are meant to be three sides of a policy “triangle”, but they cannot all be realised at the same time, at least in the short run. One perverse effect of Germany’s energy policy has been to increase power generation from coal, which spews out more carbon dioxide than natural gas, but is much cheaper. Germany’s environmentally-friendly government also recently begged Vattenfall not to ditch its plan to expand two German coal mines.

The contradictions of the *Energiewende* may spring still more surprises. In the face of hostile policy, the utilities have pushed back—which could earn them billions. They are lobbying for a “capacity market”, a financial instrument to subsidise the reserve power needed on the days when renewable generation falls short. In addition, Vattenfall, E.ON and RWE have all sued the German government for compensation. E.ON’s restructuring may be surprising, but it makes sense. Investors seem to think so too: the announcement of the split boosted E.ON’s share price. ■

Time to split

German electricity production, % of total by type



Sources: Eurostat; The Economist

Motorbikes in India

Coming out for a Hero

GURGAON

One of the world's biggest motorcycle makers wants to become even bigger

THE Hero motorcycle plant at Gurgaon, an industrial city near New Delhi, India's capital, is a model of order. The lawns are closely cropped, the plant pots well tended. The shop floor is spotless and divided into three parts. Frames and petrol tanks are welded and painted in one section. Further along, a team of 150 people in white overalls work at close quarters piecing together the components of the thousands of motorbikes made here each day. Engines are built in a third, air-conditioned zone. Assembly-line staff earn around \$800 a month, a handsome wage by Indian standards. This is the sort of jobs-intensive manufacturing that Narendra Modi, India's prime minister, would like more of.

Hero MotoCorp is one of the world's largest manufacturers of motorbikes. The factory at Gurgaon and its three sister plants can make up to 26,000 vehicles a day. Hero has roughly half of the Indian market, where 14m two-wheelers were sold last year. Yet it is not as well-known outside India as Bajaj, a rival, which sells less than half as many two-wheelers in India, but is the country's biggest exporter of such vehicles. And this is what Hero now wants to change. "Our ambition is to be a global brand," says Pawan Munjal, the firm's boss. On December 2nd it announced that Tiger Woods, a well-known golfer, would endorse its products across the globe. Hero is also building factories in Bangladesh and Colombia and it has bold plans to enter America and Europe.

To understand why Hero is only now stepping out, go back three decades to a deal that transformed the company. The firm was founded in 1956 and quickly became India's largest maker of bicycles. In the early 1980s India allowed the import of the technology needed to make small motorcycles. Hero looked to Japan for a

partner and teamed up with Honda in 1984. At the same time Honda set up another joint-venture in India to make motor scooters, then the most popular form of motorised transport. But the market changed. As the economy grew so did demand from rural Indians to travel to towns. Scooters were fine for urban roads, but not well suited to tougher rural terrain. Motorbikes trumped scooters and Hero thrived.

The deal with Honda tied Hero to markets close to home. When the two firms went their separate ways in 2011, it was free to travel farther. It now sells in 22 countries in South Asia, Africa and Latin America. "These are markets that can take our products with little modification," says Mr Munjal. The Hero Splendor, a basic, fuel-efficient 100cc bike, is the world's best-selling two-wheeler by dint of its popularity in India. At \$850, it is also well priced for other emerging markets. But Hero will need fancier products to entice rich-world consumers. Last year it launched a new research facility near Jaipur. It has plans to enter Europe and America soon with a cheap, hybrid-power scooter, driven by a battery, which is charged by an engine.

Hero is putting down a path beaten by others. Bajaj sells almost 50,000 two-wheelers a month in Nigeria, trouncing rivals from China. But for India to become as well known for its manufacturers as its IT services, much still has to change: the country's power supply must become more reliable, its labour laws more flexible and land-acquisition rules less onerous.

Hero's plant at Gurgaon is not on the power grid. Its generators run on expensive diesel much of the time because of a gas shortage. The factory spans 112,000 square metres on a tract of land that would be hard to piece together under current laws. After the rigours of India, Hero may find life on the outside a little easier. ■



Heading abroad

Online-advertising fraud

Dial "B" for bot

NEW YORK

A dark corner of the digital-advertising business needs cleaning up

A WITTY commercial for Adobe, the software firm, that aired last year showed a blissful team of executives and factory workers, who return to work when they think sales are up for their "Encyclopedia Atlantica". It turns out that an adorable baby in nappies is repeatedly clicking "buy" on a computing tablet. Real-world companies share the imaginary encyclopedia publisher's challenge of correctly sizing their audience, but are troubled by bots, not babies.

A dirty five-letter word is haunting the advertising community: fraud. This year online marketers will spend more than \$140 billion on digital advertising globally, but billions will be siphoned off by clever fraudsters, who make money by falsely claiming advertisements have been seen by consumers. Evil-doers infect personal computers with a "bot", a piece of software that visits websites in the background. It cannot be detected by the user, and is nearly impossible for advertisers to spot, because it shares the real user's unique "cookie" identifier. Fraudsters have other tricks too: they can stack hundreds of adverts on top of each other on a website, or stuff a whole website into a small pixel on a page so advertisers think their ads are seen. Either way, they are deliberately claiming "views" and "clicks" for ads that no one ever sees.

Such fraud is widespread across the online world. Some reckon non-human activity could account for around 30% of web traffic. The fraud is not evenly distributed, however. "It looks more like a cholera outbreak than background radiation. There are hot spots," says Michael Tiffany, the chief executive of White Ops, a company that works on fraud issues. The publishers that do what is known as "audience extension", which involves selling adverts on other publishers' sites, are particularly vulnerable, because their partners may not have sufficient safeguards in place. Mr Tiffany used to do cyber security for banks, but noticed fraudsters were moving into online advertising, because it is easier to avoid detection and get paid quickly.

The allure of online advertising, versus the old, analogue type, is that it is more measurable and therefore reduces wasted spending. Widespread fraud could undermine that promise. Industry trade groups are trying to do more to raise awareness about fraud by boosting transparency in the digital advertising ecosystem to make it easier to police. Some website owners are offering refunds for traffic that is found to be fraudulent, although digital trickery remains extremely hard to detect. Bots are much harder to spot than babies.



Mining and corruption

Crying foul in Guinea

Africa's largest iron-ore mining project has been bedevilled by dust-ups and delays

AN emblematic tragedy" is how Sir Paul Collier, an adviser to the British government, describes the situation in Guinea—referring not to the Ebola outbreak (awful though he considers that to be) but the saga of Simandou, a mining project mired in allegations of corruption, expropriation and corporate espionage.

Simandou, a mountainous area in southern Guinea (pictured), has been called the El Dorado of iron ore. It is the world's largest known untapped deposit of the stuff, with enough ore to sustain annual production of 200m tonnes—7% of global iron-ore output—for more than a quarter of a century. Better still, the ore there has unusually high iron content. The potential project cost for the mine, and the railway and port that would be needed to get ore on to ships, is \$20 billion, making it Africa's largest ever proposed mining venture. Guinea could do with the investment: it ranks 179th out of 187 countries in the UN's human-development index. Wags, alas, have taken to calling Simandou "Simandon't". Exploration rights were first granted in the 1990s, yet the earliest anyone expects production to begin is 2019.

The saga oozes intrigue. Among its cast of characters: two of the world's biggest mining groups, the Anglo-Australian Rio Tinto and Vale of Brazil; Beny Steinmetz, an Israeli diamond tycoon; George Soros, a billionaire philanthropist; Mark Malloch-Brown, a former deputy head of the UN;

the wife of Guinea's former leader; and, possibly, members of South Africa's elite and security services. It is, as one lawyer involved in the case wryly puts it, "a slightly Hollywood story".

The opening chapter was the awarding of exploration licences for four blocks at Simandou to Rio Tinto in 1997. The northern two blocks were snatched back from the company in 2008, as the then dictator, Lansana Conté, lay on his deathbed. The ostensible reason was that Rio was not developing the site quickly enough. Months later the rights to these blocks were assigned to BSG Resources (BSGR), a firm indirectly owned by a Steinmetz family trust. With no upfront payment required, the deal appeared to be very attractive for BSGR. Mo Ibrahim, an African billionaire, asked whether the Guinean officials who agreed to it were "idiots, or criminals, or both". After Conté's death, BSGR sold 51% of its interest to Vale for \$2.5 billion, \$500m of which was paid immediately.

A new government, led by Alpha Condé, took power in 2010, after Guinea's first democratic elections, and set up a committee to review past contracts. This concluded that BSGR got its blocks through bribery. As a result, the firm was stripped of its concession earlier this year. The government signed a new deal with Rio and its Chinese partner, Chinalco, to develop the two southern blocks they had held onto. This involved Rio having to pay

\$700m, part of which was upfront taxes.

This wrangling has generated lots of work for lawyers. Rio has filed a racketeering suit in New York against BSGR and Vale, claiming they conspired to steal the northern blocks. BSGR has an arbitration suit against Guinea; Vale has one against BSGR. The latter is sealed but understood to argue that BSGR duped Vale into buying an asset that was presented as legitimate but had been corruptly obtained. (Vale never paid the remaining \$2 billion to BSGR, but says it spent a further \$700m on Simandou.) In an interview with *Piauí*, a Brazilian magazine, Vale's former boss, Roger Agnelli, said of the union with BSGR: "A guy can marry a former hooker and only discover years later that his wife used to be a prostitute."

On top of these actions, BSGR sued Global Witness last year. The firm claims that the group violated Mr Steinmetz's privacy by publishing "personal" data in its investigative reports on the case, arguing that since Global Witness is not a bona fide journalistic outfit, but an advocacy group, it needs to comply with higher data-protection standards. Global Witness denies this. The case, which is before Britain's information commissioner and the High Court, could break new legal ground on the free-speech rights of lobby groups. Last year a related case was settled out of court when Mr Steinmetz received a portion of his costs—but no admission of fault—from Lord Malloch-Brown (a former employee of this newspaper) and FTI Consulting, the public-relations firm of which he was a regional chairman. The tycoon had sued for breach of contract and defamation, accusing Lord Malloch-Brown of persuading FTI to cancel a contract to represent BSGR, in response to pressure from Mr Soros (an associate, and a patron of Global Witness).

And then there are government investigations into Simandou, in America, Britain and elsewhere. Last week a court in Florida allowed prosecutors to seize property owned by Mamadie Touré, the widow of Conté, the late dictator, including restaurant equipment and houses, which the prosecutors believe was bought with the proceeds of corruption. The firm alleged to have given the bribes in the American government's complaint is not named, but it is unmistakably BSGR. The next legal development, expected any day, will be a ruling by a judge in New York on a motion by defendants to have Rio's racketeering suit moved to London, where the bar for proving its allegations would be higher.

Rio's legal complaint is spicy stuff. It alleges that BSGR doled out \$100m in bribes and that Frédéric Cilins, an associate of Mr Steinmetz, befriended staff at the business centre of the Novotel hotel in Conakry, the Guinean capital, to obtain copies of faxes detailing Rio's plans at Simandou. The complaint also claims that Vale feigned interest in buying assets from Rio, months

after the Brazilian group had begun secret negotiations with BSGR, in order to hoodwink Rio into showing it confidential information about Simandou's geology. Seeing an opportunity to wrest control of part of the site from its rival "on the cheap", Vale shared this data with BSGR in violation of a confidentiality agreement, Rio alleges.

Testimony and surveillance transcripts from an FBI investigation, made public by the Guinean investigating committee, are particularly illuminating. Ms Touré (who has turned co-operating witness) says BSGR offered her millions of dollars, jewellery, two Toyota Land Cruisers and a 5% stake in the project to persuade her dying husband to sign over the Simandou rights. Some of her allegations are supported by photocopies of cheques. In one transcript, Mr Cilins, having flown to Florida to meet her, urges her to destroy apparently corrupt contracts: "You have to destroy everything, urgently, urgently, urgently." He promises more money if she does, saying the message comes "directly from the number 1". When she asks who that is, he whispers "Beny". In March Mr Cilins pleaded guilty to obstruction of justice and received a two-year prison sentence.

BSGR denies wrongdoing. The company says the seemingly damning documents were "fabricated" and plays down its relationship with Mr Cilins, saying he never signed a formal contract to represent the firm. The Guinean committee was established "to provide a pretext to illegally seize our assets in Guinea", the company states. BSGR says it "looks forward to testing the evidence" at a forthcoming arbitration tribunal.

As for Rio's racketeering claims, a lawyer for BSGR describes them as "amazingly fictitious". Nevertheless, the trust that controls BSGR is said to have hired Joe Lieberman, a former United States senator, and Louis Freeh, former head of the FBI, to conduct an internal probe of the bribery allegations—though the firm will not say whether they have begun their work.

Spooky

The narrative being pushed by BSGR became clearer when it filed its defence in the Rio suit and a request for arbitration. It alleges that the election that brought Mr Condé to power was rigged with help from South African interests. These provided Mr Condé with financial and other support—including altering voter registers—in return for a promised stake in the nation's mining assets, including the blocks snatched from BSGR, its arbitration filing states. In another document it names 83 individuals and companies, including South African politicians, businessmen and spies, who could have "discoverable information" that might support its claims.

A spokesman for Guinea's government says of the alleged election-rigging: "BSGR

has never provided Guinea with any evidence to back its allegations." A spokesman for the Rainbow Coalition, of which Mr Condé's party is a member, says: "The suggestion that an outsider like Alpha Condé rigged the elections against a military insider [Cellou Diallo] beggars belief." Guinea's supreme court certified the poll result, and the Carter Centre, which promotes democracy worldwide, said the electoral process was "broadly consistent with the country's...obligations for genuine democratic elections."

Mr Condé has insisted he is cleaning up government after many years of corrupt dictatorship. But some of the regime's dealings with business raise questions about its judgment. In May, for instance, the Common Court of Justice and Arbitration, the highest tribunal of a west African body overseeing commercial law, ruled that the government acted illegally in tearing up a container-terminal management contract with Getma International, a French com-



pany, in 2011 and handing it shortly afterwards to Bolloré, another French firm. The panel awarded Getma \$49m in damages. Guinea scored just 25 out of 100 in Transparency International's latest corruption-perceptions index, placing it below Ukraine.

The closest thing the drama has to a central character is Mr Steinmetz. But seen from another angle, the colourful individuals, and even BSGR, are a sideshow. The big-picture story is a titanic battle between the giants of iron-ore mining—a business in which BSGR is a minnow—for control of the world's richest deposits. Some analysts think Rio's intention all along was to go slow with Simandou, holding it as a defensive play to frustrate global competitors.

The company may have grown less inclined to mine the site: the iron-ore price has fallen by 60% from record highs in 2011. But it is probably also loth to let it fall into the hands of a rival that could reap rewards once the price rebounds. Tellingly, Mr Agnelli said of the joint venture with BSGR: "It was strategically important for Vale not to leave Rio Tinto alone with all that ore." So important, in fact, that some of the contract terms with BSGR were rushed (or even agreed only verbally), leading to much ex-

ecutive disquiet at Vale.

Rio says it is committed to developing its two remaining blocks. It is less clear how keen it is to regain the other two. The firm has said it no longer wants to increase its exposure to Guinea, but not everyone believes that. If the government were to auction them off—it is preparing a tender—interest could come from, among others, Vale, ArcelorMittal and Glencore.

But prospective investors will have to weigh up the risks. One is the outstanding legal challenge from BSGR. Bigger ones are political uncertainty—a presidential election is due to be held next year—and Ebola.

Tunnel vision

Company accountants worry more about the project's steep costs. Simandou sits in a thickly forested mountain range—difficult terrain that greatly raises the cost of building the 650km railway (with 35 bridges and 24km of tunnels) to the coast. It doesn't help that Mr Condé has insisted the tracks run through Guinea to a domestic port, rather than taking a shorter, easier route through Liberia (see map). The government had wanted to take a big stake in the infrastructure but could not afford to. With help from the World Bank's International Finance Corporation (IFC), Simandou's managers are now looking to assemble a private consortium to finance, build and operate the railway and port. Roadshows for potential contractors begin this month. The estimated infrastructure costs are \$13 billion. Whether the project is economically viable will depend on the future trajectory of the iron-ore price.

Simandou could do wonders for Guinea's emaciated economy (GDP per person is a mere \$530). Tom Butler of the IFC, which has a 5% stake in Rio's project, describes it as "potentially transformational": even at today's deflated iron-ore price, it would produce annual revenue for the state of "a multiple of the current annual budget". It could generate tens of thousands of jobs and, thanks to the railway, make agri-business in the country's interior competitive for export. Moreover, success would encourage investment in Guinea's sizeable deposits of other minerals, such as bauxite, graphite and manganese.

But nothing will come out of the ground for at least five years. It could be closer to ten. A recent presentation by Glencore, seen by Reuters, predicted that Rio will not rush to produce iron ore from Africa because its focus in coming years will be on growth projects in Australia.

Meanwhile, the legal skirmishes will continue. The arbitration cases, for instance, could grind on for up to five years—prolonging this cautionary tale of the ugly recriminations that can follow when the rights to vast mineral riches are handed out in questionable circumstances. The beleaguered people of Guinea deserve better. ■

Schumpeter | Test-tube government

Governments are borrowing ideas about innovation from the private sector



INCUBATORS, accelerators, garages, laboratories: the best big companies have had them for years. Whatever the moniker (*The Economist* once had one called “Project Red Stripe”), in most cases a select few workers are liberated from the daily grind and encouraged to invent the future. Now such innovation units are becoming *de rigueur* in the public sector too: Boston has an Office of New Urban Mechanics; Denmark has a MindLab; and Singapore has the more prosaically named PS21 Office.

These government laboratories provide a bridge between the public and private sectors. Sometimes governments simply copy what private firms are doing. MindLab is based on the Future Centre, the innovation unit of Skandia, a big insurance firm. Sometimes they get money and advice from private sources: the New Orleans Innovation Delivery Team is partly funded by Michael Bloomberg, the former mayor of New York city and one of America’s biggest media tycoons. Whatever the connection, these units plug the public sector into a new world. They are full of people talking about “disruption” and “iteration”.

The units also provide a connection with academia. Britain’s Behavioural Insights Team, originally based in the Cabinet Office, was the world’s first government outfit dedicated to applying the insights of behavioural economics to public policy (it was known as the “nudge unit”, after the book “Nudge”, by Richard Thaler and Cass Sunstein). David Halpern, the group’s head, says that its mission was to point out the “small details” of policy that can have big consequences (see *Free Exchange*, page 00). It persuaded, for instance, HM Revenue & Customs, Britain’s tax collection agency, to tweak the words of a routine letter to say that most people in the recipient’s local area had already paid their taxes. As a result, payment rates increased by five percentage points.

A new report published by Nesta, a British charity devoted to promoting innovation, and Bloomberg Philanthropies shows how popular these government innovation labs have become. They can be found in a striking variety of places, from developing countries such as Malaysia to rich countries like Finland, and in the offices of mayors as well as the halls of central government.

Whatever their location, the study suggests they go about things in similar ways, with a lot of emphasis on harnessing technology. The most popular idea is co-creation—getting one’s cus-

tomers to help invent and improve products and services. Boston’s Office of New Urban Mechanics has produced a series of apps which provide citizens with a convenient way of reporting problems such as graffiti and pot holes (by taking a photograph and sending it to city hall, users provide it with evidence and GPS co-ordinates). The staff-suggestion scheme introduced by PS21 in Singapore has produced striking results: one air-force engineer came up with the idea of scanning aircraft for leaks with ultraviolet light, just as opticians scan the cornea for scratches.

Co-creation frequently goes hand in hand with open innovation and the sharing economy. Nesta and iZone in New York city both offer prizes to encourage people from outside government to come up with ideas. Sitra, in Finland, and the Centre for Public Service Innovation, in South Africa, both invest in companies, particularly in health care. The Innovation Bureau in Seoul is extending the concept of collectively using expensive resources: “generation sharing” matches elderly people who have a spare room with students who need a place to stay and are willing to help out with housework.

The most striking thing about these institutions, however, is their willingness to experiment. Policymakers usually alternate between hostility to new ideas and determination to implement a new policy without bothering to try it out first. Innovation centres tend to be both more daring and happy to test things. Sitra, for instance, is experimenting with health kiosks in shopping centres which are staffed by nurses, provide routine care and stay open late and on weekends. The Centre for Social Innovation in Colombia has developed computer games which are designed to teach pre-teenagers to make sensible choices about everything from nutrition to gang membership. Sitra also tracks the progress of each project that it funds against its stated goals.

It is easy to dismiss these public-sector innovators as jargon-spouting irrelevancies. America’s federal government spends almost \$4 trillion a year. What difference can a few reformers in mayor’s offices in Boston or New Orleans make? Bureaucracies are designed to kill innovation in the name of predictability. And a change in the political wind can reverse sensible changes: New York’s new mayor, Bill de Blasio, is undoing many of the reforms that Mr Bloomberg implemented. Politicians can also sometimes treat the existence of innovation centres as a justification for carrying on with business as usual elsewhere. What is more, such centres spend a lot of time putting sticking plasters on cancers. It is admirable that France’s Experimental Fund for Youth provides young people with driving licences at reduced cost. It would be better if the government changed the rules that make getting a licence in France such a lengthy and expensive nightmare.

Nudging New South Wales

Still, something is surely better than nothing. And the various innovation centres have a growing number of somethings to their name. They have suggested some sensible policies: Colombia’s video games have been downloaded 40,000 times and Sitra’s health kiosks are proving popular. They have also begun to change the institutional landscape. This year Britain’s Behavioural Insights Team transformed itself into an independent social-purpose company, partly owned by the British government, that sells its services to governments around the world and maintains a division in New South Wales. Reforming government is hard and often boring work. The innovation labs are making it a bit faster and a lot more interesting. ■



Shale oil In a bind

LINDSAY, OKLAHOMA

In the first of two pieces about oil, we look at whether falling prices will curb America's shale boom

THIS year's Christmas parade in Lindsay, in the heart of Oklahoma's oil country, featured the Stars and Stripes every ten yards, 11 horses with riders in Santa hats and a rifle salute by veterans. But the highlight was a thundering, bright red oil tanker covered in fairy lights and owned by Hamm & Phillips, an oil-services firm with local roots that has ridden the shale boom in the state and across America.

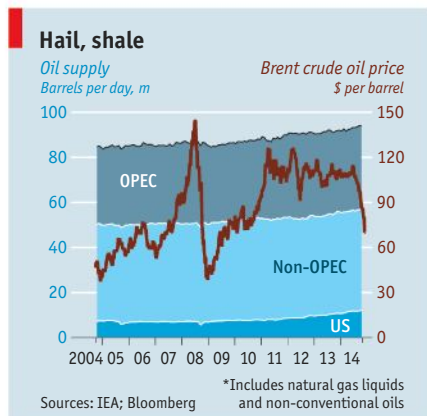
That energy revolution is the envy of the business world. Abundant oil and gas have been extracted from underground rocks by blasting them with a mixture of water, chemicals and sand—"fracking", in the jargon. As well as festive spirit, the firms responsible embody an all-American formula of maverick engineers, bold entrepreneurs and risk-hungry capital markets that no country can match.

Yet now that oil prices have fallen by almost 40% in six months, these firms' mettle is being tested. Across America shale-shocked executives will spend Christmas overhauling their strategies to cope with life at \$70 per barrel, even as investors dump their firms' shares and bonds. Executives at Lukoil, a big Russian firm, now sniff that shale is like the dotcom bubble—a mania that is being cruelly exposed.

Oil-price slumps usually lead to cuts in energy firms' investments. Production eventually falls, helping prices to stabilise. In 1999, after the Asian crisis, global investment in oil and gas production dropped by 20%. A decade later, after the financial crisis, investment fell by 10%, then recovered.

This time some of the pain will be taken by the big integrated energy firms, such as Exxon Mobil and Shell. After a decade of throwing shareholders' cash at prospects in the Arctic and deep tropical waters to little effect, they began cutting budgets in 2013. Long-term projects equivalent to about 3% of global output have been deferred or cancelled, says Oswald Clint of Sanford C. Bernstein, a research firm. Most "majors" assume an oil price of \$80 when making plans, so deeper cuts are likely.

But much of the burden of adjustment will fall on America's shale industry. It has been a big swing factor in supply, with output rising from 0.5% of the global total in 2008 to 3.7% today. That has required hefty spending: shale accounted for at least 20% of global investment in oil production last year. Saudi Arabia, the leading member of



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OPEC, has made clear it will tolerate lower prices in order to do to shale firms' finances what fracking does to rocks.

Even the gods of shale disagree about the industry's resilience. The boss of Continental Resources, Harold Hamm (whose fortune has dropped by \$11 billion since July), has said he can cope as long as the oil price is above \$50. Stephen Chazen, who runs Occidental Petroleum, has said the industry is "not healthy" below \$70. The uncertainty reflects the diversity of activity. Wells produce different mixes of oil and gas (which sells for less). Transport costs vary: it is cheap to pipe oil from the Eagle Ford play, in Texas, but expensive to shift it by train out of the Bakken formation, in North Dakota. Firms use different engineering techniques to pare costs.

Two generalisations can still be made. First, in the very near term, the industry's economics are good at almost any price. Wells that are producing oil or gas are extraordinarily profitable, because most of the costs are sunk. Taking a sample of eight big independent firms, average operating costs in 2013 were \$10-20 per barrel of oil (or equivalent unit of gas) produced—so no shale firm will curtail current production. But the output of shale wells declines rapidly, by 60-70% in their first year, so within a couple of years this oil will stop flowing.

Second, it is far less clear if, at \$70 a barrel, the industry can profitably invest in new wells to maintain or boost production. Wood Mackenzie, a research consultancy, estimates that the "break-even price" of American projects is clustered around \$65-70, suggesting many are vulnerable (these calculations exclude some sunk costs, such as building roads). If the oil price stays at \$70, it estimates investment will be cut by 20% and production growth for America could slow to 10% a year. At \$60, investment could drop by as much as half and production growth grind to a halt.

The industry's weak balance sheet is ►►

▶ also a vulnerability, says Michael Cohen of Barclays, a bank. Most firms invest more cash than they earn, making up the difference by issuing bonds. Total debt for listed American exploration and production firms has almost doubled since 2009 to \$260 billion (see chart), according to Bloomberg; it now makes up 17% of all America's high-yield (junk) bonds. If debt markets dry up and profits fall owing to cheaper oil, the funding gap could be up to \$70 billion a year. Were firms to plug this by cutting their investment budgets, investment would drop by 50%. In 2013 more than a quarter of all shale investment was done by firms with dodgy balance sheets (defined as debt of more than three times gross operating profits). Quite a few may go bust. Bonds in some smaller firms trade at less than 70 cents on the dollar.

All this suggests looming investment cuts that within a year will slow growth in American shale production to a crawl and perhaps even lead to slight declines. A few firms have trimmed their budgets already. More are expected to announce cuts in January. "Frontier" projects—on the fringes of existing basins or in places where little commercial production has taken place—are vulnerable, including Oklahoma. Most firms will hunker down in the Bakken, the Eagle Ford and the Permian Basin, where they have scale and infrastructure. Even in the Bakken, applications for drilling permits fell by almost 40% in November.

A fractured balance-sheet

Leverage of US independent energy companies



OPEC's wishes may seem to be coming true over the next year. But adversity will eventually make shale stronger. It will prompt a new round of innovation, from cutting drilling costs through standardisation to new fracking techniques that increase output. Dan Eberhart, the boss of Canary, a Denver-based oil-services firm, says the industry has already "pressed fast forward" on saving costs.

And if and when prices recover, new wells can be brought on stream in weeks, not years. America's capital markets will roar back into life, forgiving all previous sins. "There is always a new set of investors," says the boss of one of the world's biggest natural-resources firms. He predicts a shale crash—and a rapid rebound. ■

Deposit insurance in China

A premium for risk

A scheme to protect savers exposes Chinese banks to useful uncertainty

DEPOSIT insurance is normally intended to make bank failures less likely. It was first adopted in America during the Depression, when nearly half the country's 24,000 banks failed. Similar schemes, which aim to deter runs by indemnifying savers from losses up to a certain level if their bank goes bust, spread through Europe in the wake of financial crises from the 1970s on. The imminent launch of deposit insurance in China, however, inverts the usual logic. The Chinese financial system could hardly be more stable: it has been 16 years since a big bank failed. The aim is to shake things up—to add risk to a banking sector that has come to expect the government's help.

After years of studying other countries' deposit-insurance schemes, China's government lifted the veil on its plan on November 30th. It proposes to insure all accounts for up to 500,000 yuan (\$81,300). That is well below the \$250,000 ceiling in America, but above Hong Kong's guarantee of \$65,000 and Singapore's of \$40,000. With the vast majority of Chinese savers holding far less than the maximum, the central bank has calculated that 99.6% of depositors will be protected in full.

That may sound awfully generous, but it marks a step back from the current assumption that the state will stand behind all financial institutions in all circumstances. At the end of the 1990s, when bad loans accounted for one-third of banks' assets, the government gave them a giant infusion of capital. More recently support has even extended to their off-balance-sheet business. When an investment product sold by Industrial and Commercial Bank of China was on the verge of defaulting this year, regulators orchestrated a bailout. This has fuelled capital misallocation as bankers shrug off risk, counting on the government to rescue them at a pinch.

They will need to think twice after the deposit insurance kicks in. Any person or company with more than 500,000 yuan in their account will want to make sure their bank is well run. Banks will receive no insurance coverage for their off-balance-sheet vehicles. These offer high-yielding pseudo-deposits that have hoovered up 15 trillion yuan—equivalent to 14% of conventional deposits—in little more than five years, but will now look less attractive. By creating a safety net for the banking sector, the insurance scheme also sets the stage for the eventual deregulation of interest rates ▶▶

OPEC

Making the best of a low price

CAIRO

What is the oil cartel up to?

AN EFFECTIVE cartel requires three things: discipline, a dominant market position and barriers to entry. The Organisation of the Petroleum Exporting Countries lacks all three. Its members cheat on their quotas. It supplies only 30% of the world's oil—too little to exercise control. New producers abound.

That is the backdrop to OPEC's decision last month to make no attempt to bolster the oil price, sending it below \$70 a barrel—a near 40% drop since June. Saudi Arabia, its most influential member, could have sent the price up single-handedly by deciding to pump less. Unlike cash-strapped oil exporters such as Venezuela, the kingdom can afford self-denial: it has savings of \$900 billion.

But Saudi Arabia can also weather a low price: its production costs are \$5-\$6 a barrel—the lowest in the world. Moreover, history suggests most of the gains from any cut in its output would go to other producers, who would sell their oil for more while increasing their market

share. Saudi Arabia did try the tactic in the early 1980s, cutting its output by three-quarters from 10m b/d in 1980 to under 2.5m in 1985-6. The result was higher prices, but also a boom in investment, and then production, in places such as Britain and Norway.

Trying to save OPEC with such tactics could be even more dangerous now. Keeping the price up would be good news for frackers, speeding the spread of that technology from America to other countries. Costly oil spurs thrift too, hastening the shift away from oil in transport. Every hybrid or electric car spells lost business for oil producers. Why encourage them?

Cheap oil also has its consolations. Russia and Iran, two countries with which Saudi Arabia has its differences, are suffering much more. Better still, if low prices stem investment in other sources of oil, such as Canada's tar sands or America's shale, that means more demand for low-cost Saudi oil in future.

► on deposits, which will allow banks to compete more vigorously.

As in America and many other places, the deposit-insurance scheme will be funded by a levy on banks' assets. If banks mismanage their books, they will be put on notice. Just as car insurance often costs more for young men, banks that are classified as bigger risks will have to pay extra to secure protection. Moreover, if their capital falls too low or their leverage rises too high, regulators could order their closure, transferring their assets to other institutions.

Some fear that, perversely, the scheme may cause trouble for rural credit co-operations,

because the notion that any bank might be allowed to fail will prompt savers to move their deposits to bigger institutions, the insurance notwithstanding. Another worry is that the scheme will be too puny to make a difference. With the levy expected to be no more than 0.05% of deposits, it will take a decade to accumulate a trillion yuan, barely enough to cover the deposits of a middling bank. However, says Victor Wang of Credit Suisse, the government could easily solve this problem by issuing a bond to give the insurance fund a cushion of cash from the outset.

The bigger concern is that the govern-

ment will continue to stand behind uninsured deposits. The 0.4% of accounts that are not fully covered contain more than half of all money on deposit. Much of this belongs to state-owned enterprises, the country's richest firms. The government has no appetite to let them go bust; nor does it want to see the collapse of the banks managing their cash. So the implicit, blanket guarantee for state firms and good-sized banks will endure. Nevertheless, too-big-to-fail would be progress of a kind for the Chinese financial system. It suggests the government would at least be willing to let small banks bite the dust. ■

Buttonwood | Take your pick

The key to stockmarket success is avoiding the worst sectors

THE collapse in the oil price is a useful reminder for investors that it helps to pick the right industries. As of December 2nd, global energy stocks were down 8.7% on the year, lagging nearly 31 percentage points behind returns in the best-performing sector of the year, health care.

This divergence between sectors is relatively mild by historical standards. In 2013 there was almost a 39-point gap between the best performer, retailing, and the worst performer, materials, a portmanteau category covering miners, chemical manufacturers and the paper and packaging industry. Robert Buckland, an equity strategist at Citigroup, says that big relative moves among sectors tend to be a function of volatility, and 2014 has been a reasonably calm year.

Nevertheless, it pays to avoid the laggards. *The Economist's* hypothetical prescient investor, Felicity Foresight, would have earned a return of 66% since the start of 2007, had she simply steered clear of the worst-performing sector each year. That is more than double the 32% return of the MSCI World index over the same period (see chart).

Of course, sectors are not the only important factor. Investors would have done even better if they had got out of equities altogether in 2008. But many managers do not have that option; they run mutual funds that are devoted exclusively to stocks and cannot switch into bonds.

Get your economic calls right and the sectors tend to select themselves, says Chris Watling of Longview Economics, a consultancy. The big themes in recent years have been the financial crisis and the subsequent sluggish performance of first developed, and then developing, economies. That has favoured those sectors which are more defensive in nature. People will always be sick, so health care



companies will always have a market (the introduction of Obamacare seems to have been no problem for the sector). The same can be said for consumer staples (a group that includes packaged foods, soft drink manufacturers and, er, tobacco). These two sectors have been the best performers since the start of 2007.

But even investors who correctly anticipated these developments may have been caught out from time to time by huge swings in sentiment. Global financial stocks may be lower than they were at the start of 2007, but they were the best-performing stocks of 2012. The materials grouping has been either the best or the worst sector in four of the last eight years.

Both sectors are volatile by their very nature. Financial stocks (or at least, the banks) are highly indebted; materials firms are very dependent on the economic cycle.

Another sector which has had its moment in the sun (topping the charts in 2010 and 2013) despite its dependence on the health of the economy has been the consumer discretionary group. This includes car manufacturers, entertainment and restaurants, and thus is vulnerable when wal-

lets are being squeezed.

Most fund managers don't tend to think of themselves as sector selectors, but as stock-pickers. They like to pore over balance sheets, visit factories and spot the best management teams. But sometimes they can drift into making sector-based bets. At the end of 2006, Buttonwood heard Bill Miller, Legg Mason's star fund manager, recount his top bets for 2007, which included a lot of housebuilding companies. He then loaded up on financial stocks when they started to fall. Both bets went disastrously wrong.

In the late 1990s it was impossible not to be a sector selector. As a fund manager you were either a believer in TMT (technology, media and telecom) stocks or you were not; if the latter, you lost your job and if the former, you lost your clients' money when the bubble burst. The gap at the time between best and worst performers was over 100 percentage points.

Since then, technology has lost some of its "wild West" aura. At the height of the dotcom boom, companies were being floated with barely any revenues, let alone profits. Investors are still happy to buy loss-making companies in the hope that they will eventually come up with a way of turning user enthusiasm into revenues—take Twitter, for example. But investors have an example of the way that social media websites can be monetised in the form of Facebook. And whereas valuations in the late 1990s were stratospheric, the price-earnings ratio on the global-technology index is currently 22. It is a sign that the tech sector has matured that it has not been the best or worst performer in any of the last eight years; no longer does a manager's reputation depend on calling it right.

Investment banking

Trading places

NEW YORK

After decades of consolidation, Wall Street is fragmenting

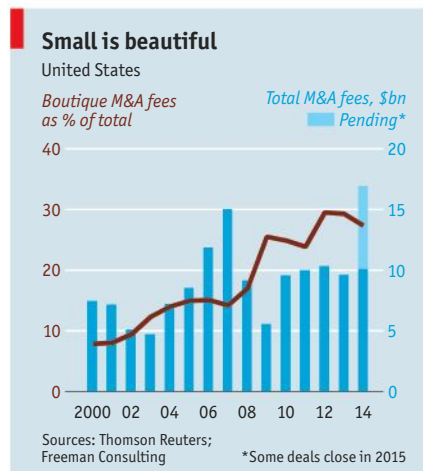
AS NEW YORK'S lefty mayor Bill de Blasio likes to say, the Big Apple is a tale of two cities, one on the ups and one on the downs. It might surprise Mr de Blasio that this is true even of Wall Street. Large banks, hammered for their own failures and those of the government, are going through endless rounds of cost cuts and redundancies to pay for fines and ever more compliance. In contrast, a handful of smaller financial institutions, many created by refugees from big firms, are doing well.

So-called "boutique" investment banks have gained a much larger share of the lucrative business of advising on mergers and acquisitions (M&A) since the financial crisis (see chart) and are gaining other footholds. Their flourishing has put paid to the belief that consolidation was inevitable as one institution after another was crushed or absorbed by bigger rivals. The giants who offered advice, credit, trading, research and underwriting on top of the technological capacity to track what was going on used to seem unstoppable.

But technology now comes cheap and breadth is as likely to result in fines as in synergies. Minnows, often still under the management of a charismatic founder, are snaffling the business that once belonged by right to Wall Street's titans. Their main product is one in which personal relationships matter a lot and scale very little: advice on M&A. Another strength is restructuring, since in a bankruptcy or reorganisation, the institutions that provide capital—the large, established, banks—have too many conflicts to participate. Over time, a third business has emerged: providing advice on how best to exploit capital markets.

The publicly traded quartet of Moelis, Evercore Partners, Greenhill & Co and Lazard are flourishing. They trade at profit multiples many times higher than their larger rivals, some of which are deemed to be worth less than the value of the assets on their books. That there has been a surge in M&A while other bits of investment banking are struggling probably helps.

The tiddlers' success has resulted in a transformation in the perceived wisdom. In the period leading up to the financial crisis Lazard and the family-controlled Rothschild, both founded in the 19th century, were seen by many outsiders as relics for maintaining their independence and focus; now they represent models to be emulated. Their revenues, the biggest among



boutiques, have become benchmarks.

The current flock of competitors caught on to the new environment early on. In the 1990s Robert Greenhill left Morgan Stanley to work for a key client, Sandy Weill, who was in the process of assembling numerous investment firms into what would become the disastrous amalgam of Citigroup. Mr Greenhill later went on to create a new firm as narrow as Citi was broad. Privately-held Perella Weinberg was set up in 2006 by men who had worked at Credit Suisse, Morgan Stanley and Goldman Sachs. Ken Moelis began his firm in 2007 after stints at

various big investment banks.

There are more potential businesses to pick off, most notably asset management, which does not require capital. But one of the big selling-points of boutique banks is round-the-clock access, often to senior executives. That requires minimising distractions and maintaining flat managerial structures. It also makes it hard to take part in heavily regulated activities such as taking in deposits, making loans, holding physical commodities, structuring derivatives and trading.

Clients distrust mega-banks, where conflicts of interest abound. Cost-cutting is also hampering those banks' efforts to fend off the upstarts. In a small example, one big bank is said to be drastically curtailing travel to reduce expenses in the current quarter, despite an ongoing frenzy in the merger market. None of the boutique banks would skimp on plane tickets when opportunities beckoned.

Having firms so heavily dependent on individuals carries risk of its own. But it is employees and shareholders, not taxpayers, that have to worry about that: the boutiques are not "too big to fail". Their recent growth is a welcome sign that America's beleaguered financial markets are evolving. Even more heartening is their capacity, should their business dry up, to disappear without causing chaos. ■

Corporate debt in India

Power cut

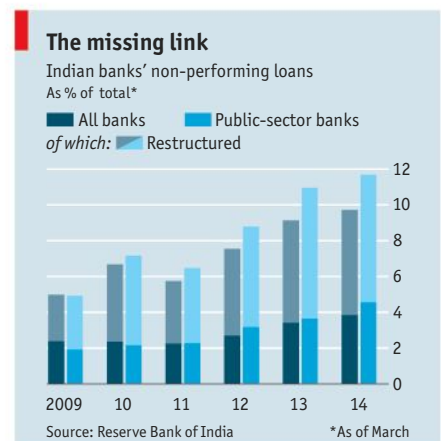
MUMBAI

Hamstrung banks are a barrier to faster economic growth in India

"WE WANT to make sure that this is for real," said Raghuram Rajan, referring to the recent drop in inflation in India, to 5.5%. Mr Rajan, the head of the Reserve Bank of India, was speaking after the central bank decided to keep its main interest rate at 8%. India's finance minister, Arun Jaitley, was part of a chorus that had been calling for a rate cut. The RBI seems increasingly likely to meet its goals of pushing inflation below 8% by January 2015 and below 6% by January 2016. Mr Rajan chose to be cautious. However, he did suggest lower interest rates were likely early next year if the outlook for inflation was still rosy. The government, he also said, was minded to set a formal inflation target for the RBI soon, of 2%-6% beyond 2016.

India has been lucky. It had been struggling to contain inflation until weaker prices for its imports, most notably oil, provided a boost. But there is concern about a recent loss of momentum in the economy. Figures published on November 28th

showed GDP growth slipping to 5.3% in the year ending in September. Investment was especially weak. Credit growth has been feeble. The main cause of both is not the level of interest rates but an overhang of debt. Indian firms are heavier borrowers, ►►



► measured by debt-to-equity ratios, than those in any other emerging market bar Brazil, according to a recent analysis by the IMF. The worry is that banks will not be able to fund fresh investment because they are weighed down by dud loans.

Most of India's private debt is owed by companies. The incidence of non-performing loans is rising. Including "restructured assets", loans whose terms have been rejigged to make payment easier, troubled assets are 10% of all lending (see chart on previous page). The problem is bigger among public-sector banks, which account for more than 70% of the loan stock. Around 15% of restructured loans typically turn bad in India. But in the aftermath of an investment boom, such as the one the country enjoyed until 2012, the rate at which such loans sour again may prove to be higher than that.

Analysts at Credit Suisse, a brokerage, find that a third of the debt in its sample of 3,700 listed companies is held by firms that paid more in interest than they earned in the past quarter. Many debt-ridden firms had no earnings at all. Much of the trouble lies with infrastructure, power and metal companies that invested heavily in the go-go years. Some completed projects lie idle waiting for officials to sign off on an all-important detail—allowing a power station to procure coal from a particular mine, for instance. The government was making inroads into the backlog of stalled projects until September, when the supreme court cancelled more than 200 coal-mining licences it said had been sold unfairly. Fresh auctions for many of the affected areas will take place in February. But the delay has put \$40 billion of debt at risk, according to Credit Suisse.

Some ventures will eventually come good but others may no longer be viable. The courts move slowly in India so banks have trouble getting their money back when borrowers get into trouble. That is why, as Mr Rajan pointed out in a recent speech, the average interest rate on loans to the power industry is 13.7%, well above the average home-loan rate, of 10.7%. When the spread over the RBI's benchmark rate, of 8%, is so large, the cut in interest rates hinted at by Mr Rajan will not make as much difference as it should.

Presenting his budget in July, Mr Jaitley said that India's banks would need \$40 billion (2% of GDP) of fresh capital by 2018 to comply with international regulations. But Credit Suisse's analysts argue that up to \$45 billion more will be needed to fill the hole left by bad debts. The government, which is battling to contain a budget deficit, has said it will raise capital for public-sector banks by further reducing its stake in them to 52%. It will need to do more. Without well capitalised banks, India will not be able to reach the faster growth rate the government has promised. ■

Lithuania and the euro

Strange bedfellows

VILNIUS

The euro zone's newest member faces an uphill struggle

ON JANUARY 1st Lithuania will become the 19th member of the euro zone. The small Baltic state of 3m people is one of Europe's fastest-growing economies. The euro zone is on the verge of recession and deflation. So why does Lithuania want to adopt the single currency?

Fewer than half of Lithuanians are keen, according to a recent survey by Eurobarometer. But, like all countries that joined the European Union after the euro's creation, Lithuania is obliged to. Since 2002 it has pegged its currency, the litas, to the single currency. It tried to join in 2007, but was rebuffed on the grounds that its economy was out of sync with the euro zone's.

It still is. Since 2011 the euro zone has stagnated; Lithuania's GDP has grown by 4.3% a year. Its ratio of government debt to GDP is among the lowest in the EU. Moreover, this impressive performance is the result of the sort of root-and-branch reform most euro-zone countries have shirked. In response to a domestic financial crisis in 2009—a hangover from a credit bust in which GDP dived by 15% and unemployment hit 18%—Lithuania swiftly enacted austerity. From 2009 to 2013 the government slashed spending by 10.5 percentage points of GDP—more than any other country in the EU. It slimmed its budget deficit

from 9.3% to 2.6% of GDP.

Lithuanian policymakers insist that their country needs the euro all the same. Vitas Vasiliauskas, the lugubrious, waist-coated chairman of the central bank, and Rimantas Sadzius, the finance minister, both sing its praises. They think it will allow the government to borrow more cheaply. When Estonia, another Baltic state, joined in 2011 its government's credit rating rose by several notches—the equivalent of Thailand morphing into Taiwan. Rating agencies noted that its banks and central bank had gained access to ECB funding in an emergency. In addition, the euro zone's fiscal rules added an extra check on government excess (although one that is observed more often in the breach, at least by bigger euro members). Assuming Lithuania wins similar treatment, the average interest rate at which the government borrows could fall by 0.8 percentage points, according to central-bank forecasts.

The euro will also boost trade, says Mr Vasiliauskas. The euro zone is already Lithuania's biggest export market. Firms will no longer have to spend money guarding against fluctuations in the value of the litas. They will also benefit from the lower borrowing costs. All told, the bank expects euro adoption to boost GDP over the long term by about 1.3%.

There are also geopolitical reasons why joining the euro may be handy. Lithuania is an ex-Soviet nation and Vilnius is a short flight from Moscow. Russophones—the group that Vladimir Putin has undertaken to "protect"—make up about 5% of the population. Russian sabre-rattling might unsettle the litas; the euro should hold up better.

But the euro could also exacerbate one of the Lithuanian economy's weaknesses. The country is one of the world's most export-intensive, yet the productivity of Lithuania's workers is one-third of the euro-zone average. Cheap labour helps to make its exports competitive. Yet real wages have grown by 5% this year, far above the euro zone's rate of about 1%.

In part, that is due to a 25% hike in the minimum wage that occurred last year. But Lithuania's odd labour market is also responsible. For years emigration, particularly of young people, has been high: since 1990 the population has fallen by 20%. Worse, a tenth of adult Lithuanians cannot work for lack of even basic skills. The talented workers that remain are rewarded



A ticket to Taiwan

▶ handsomely. Wages are therefore expected to outpace productivity for the next few years, despite the government's promise to use EU funds to boost skills.

Wage growth, in turn, could lead to price rises. The IMF expects Lithuanian inflation to exceed the euro zone's for the next few years, meaning that over time Lithuanian goods may become relatively more expensive.

The worry is that history will repeat itself. Lithuania may gradually lose competitiveness, just as Greece and Portugal did before the euro crisis. According to DNB, a bank, its current-account deficit will hit 2% of GDP by 2016, a 3.5 percentage point deterioration from 2013. Euro-zone membership and the associated cheap debt may amplify the country's weaknesses, not reduce them. ■

Private equity

Last hurrah

When buy-out funds throw good money after bad

COULD Four Seasons Health Care, Britain's biggest chain of homes for the elderly, be the latest business backed by private equity to topple over? Terra Firma, the private-equity group that owns it, has called in the advisory arm of Blackstone, another private-equity outfit, to ponder its future (there is no suggestion that Four Seasons will cease to operate). An analysis of how Terra Firma's ward got into trouble

will undoubtedly focus on the debt that its owner piled onto it. But inducing the firms in which they invest to borrow sums they will struggle to repay is not the only way in which private-equity firms can be careless with other people's money.

Terra Firma bought Four Seasons for £825m (\$1.3 billion) in mid-2012 from RBS, a bank, which took control of the struggling business at the height of the financial crisis. It paid with £325m of the funds it manages on behalf of outside investors and with £500m it had borrowed. As is common in private-equity deals, the debt of Terra Firma's fund was repaid using new loans taken out by Four Seasons. Higher-than-expected nursing costs and lower-than-expected payments from local governments, Four Seasons's main customers, have since squeezed its earnings, leaving it struggling to service its debts.

If Four Seasons defaults and investors in the Terra Firma fund concerned (it has several) end up losing money on the deal, it will be a depressing vindication for those who questioned Terra Firma's motives back in 2012. The deal was part of a last-minute shopping spree using money that, if not spent, would have had to be returned soon afterwards to investors in the fund. Some of them had asked Terra Firma not to spend the money, to no avail.

Such misaligned interests are relatively rare in private equity: a firm that riles investors will struggle to raise money for future funds. But Terra Firma had little hope of raising more money anyway, since the same fund had also been involved in one of the biggest private-equity fiascos of all time, the disastrous purchase of music label EMI in 2007, which cost investors £1.75 billion. Since then, few apart from Terra Firma's boss, Guy Hands, have been very upbeat about the firm's future.

If a private-equity firm's chances of raising new money evaporate halfway through a fund's life, spending its remaining cash willy-nilly becomes rational. There is always the hope of making up for past losses if new ventures pay off. Moreover, buying something (anything!) prolongs the fund's life, and thus the period during which the private-equity firm that manages it gets to collect management fees of 2% a year.

Some investors saw Terra Firma's eleventh-hour investments in 2012 as a desperate bet. The purchase of Four Seasons has certainly not worked out, although the smaller acquisition of a chain of garden centres may still turn a profit. This means investors will suffer big losses: according to PitchBook, a data provider, the Terra Firma III fund's internal rate of return this year is -8.8%, a shocking performance compared to similar funds such as Carlyle Europe Partners (9.3%) and Bridgepoint Europe (11.23%). On top of that loss, of course, will come the fees investors must still pay. ■

The status of economists

The power of self-belief

A new paper looks at how economists became so influential

"IF ECONOMISTS could manage to get themselves thought of as humble, competent people, on a level with dentists, that would be splendid!" said John Maynard Keynes, a British economist. Despite their collective failure to predict the financial crisis, let alone follow Keynes's injunction, economists are still very influential. They write newspaper columns, advise politicians and offer expensive consulting services to business-folk far more than other academics. A new paper* tries to explain why.

One reason, say the authors, is that economists have come to believe that they are superior. A survey in 1985 found that just 9% of graduate students in economics at Harvard strongly believed that economics was "the most scientific of the social sciences". But as economics became ever more mathematical, its practitioners grew in self-confidence. By 2003 54% of the graduate economists studying at Harvard strongly agreed with the statement. A glance at a popular blog for doctoral students in economics, econjobrumors.com, gives a taste of the contempt in which its users hold other disciplines. Sociologists "play around with big important ideas without too much effort or rigour," one econo-nerd asserts.

The authors point out that economists demonstrate their self-belief in subtler ways too. Articles in the *American Economic Review* cite the top 25 political-science journals one-fifth as often as the articles in the *American Political Science Review* cite the top 25 economics journals. Another study found that American economics professors were less likely



than their peers in other subjects to agree with the notion that "interdisciplinary knowledge is better than knowledge obtained by a single discipline."

The odd thing, the authors argue, is that we believe in economists almost as much as they believe in themselves. Journalists and politicians seek strong arguments and clear answers. Most academics are reticent types: historians, for instance, question whether you can learn anything from history. "For a moderate fee," jokes Deirdre McCloskey, an economic historian, "an economist will tell you with all the confidence of a witch doctor that interest rates will rise 56 basis points next month or that dropping agricultural subsidies will increase Swiss national income by 14.8%."

* "The superiority of economists", by M. Fourcade, E. Ollion and Y. Algan, MaxPo Discussion Paper 14/3.

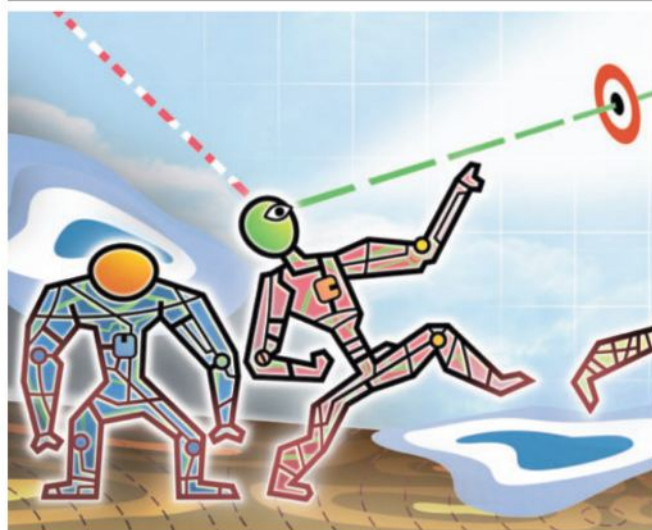
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Free exchange | Poor behaviour

Behavioural economics meets development policy



ABAT and a ball cost \$1.10 between them. The bat costs \$1 more than the ball. How much does each cost? By paying attention to how people actually think, behavioural economics has qualified some of the underlying assumptions of classical economics, notably that everyone is perfectly rational. In fact, the mind plays tricks, dividing up \$1.10 (in this example) neatly into \$1 and 10 cents, rather than correctly into \$1.05 and 5 cents. People also tend to copy others and often prefer to co-operate rather than compete. For these reasons, some of the simplifying assumptions of economics are not always correct: people do not act in every instance in their long-term self-interest; they do not weigh up all the costs and benefits before taking a decision.

Many of the insights of behavioural economics were based on studies of American university students and other privileged folk. But they apply with greater force to the poor—both the poor in rich countries and the more numerous inhabitants of developing ones. Behavioural economics therefore has profound implications for development. The new “World Development Report”, the flagship publication of the World Bank, considers them*.

As the report shows, the poor are more likely than other people to make bad economic decisions. This is not because they are irrational or foolish but because so much is stacked against them. They are more likely to lack the basic information needed to make good choices, such as which fertiliser to use or when to apply it. They are more likely to live in societies which hold mistaken or harmful views, such as that girls should not go to school.

Conventional economic thinking assumes the poor will want to earn their way out of poverty. But as studies from countries as different as Ethiopia and France show, poverty makes people feel powerless and blunts their aspirations, so they may not even try to improve their lot. When they do, they face obstacles everywhere. They have no margin for error, making them risk averse. If they do not know where their next meal is coming from, saving and investing for the future is hard. George Orwell said, “Within certain limits, the less money you have the less you worry.” He was wrong. The poor are subject to exceptional levels of stress: childhood sickness is more likely to be life-threatening; crop failure can lead to destitution. And stress makes good decision-making harder. Above all, the poor lack the institutional framework

which, in the West, improves decisions. Everywhere, people underestimate the benefits of education and save too little for their retirement. But children in the West go to school as a matter of course; pension systems make some savings automatic. Poor countries provide few such props.

All this helps explain why the poor stay poor; why (for example) subsistence farmers do not buy fertiliser or put children into secondary school, though they would benefit from doing so. More important, though, behavioural economics provides a different way of thinking about some of the problems of poverty.

Traditional development programmes stress resources and markets. People are poor, the argument goes, because they lack resources: not just money but roads, clinics, schools and irrigation canals. The job of development is to provide those things. And since resources also need to be allocated properly, prices have to be right. So a lot of development is about freeing prices and making markets more efficient.

A behavioural approach to development is different. It focuses on how decisions are made and how they can be improved. For example, in Bogotá a conditional-cash transfer programme paid mothers a monthly stipend if they took their children to school. Attendance during the school year was good but re-enrolment rates were low. A shift in the timing of the hand-out—withholding a part of the regular payment until just before the start of the school year—boosted enrolment sharply. This makes little sense in conventional economic terms: going to school is so beneficial that families should not need extra incentives and the overall sum available did not change. Yet the pay-off was substantial.

Actions like this sound marginal. Economists should be paying attention to the details of policy anyway. It may not seem to amount to a profoundly different approach—but it actually might.

A tweaking revolution

Some small-scale policies turn out to be far from marginal. A programme in Jamaica in the 1990s taught mothers of chronically malnourished toddlers how to play with them in such a way as to encourage greater verbal and physical skills—a behavioural tweak. Twenty years later, the average earnings of these children (among the most deprived in the country) were higher than those of children who had not been malnourished, and far higher than malnourished children who were not part of the programme. Paying attention to how the poor actually think would also imply big changes to financial-inclusion policies, encouraging financial products that people want to buy.

Moreover, development experts have their biases and blind spots, like anyone else. In principle, behavioural development could sit happily alongside the traditional sort. In practice, the two will compete for resources and professional attention.

A behavioural approach to poverty is not new. The World Bank has long had a behavioural unit. The Poverty Action Lab at the Massachusetts Institute of Technology has championed randomised control trials to test tweaks to policy. But by making this the subject of its main annual publication, the Bank has brought behavioural economics into the mainstream of development. It is likely to prove a challenge to traditional ways of combating poverty, as well as a complement to them. ■

* “World Development Report 2015: Mind, society and behaviour”.

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Manned space flight

This time it's different...

The maiden voyage of NASA's first post-Shuttle spacecraft capable of carrying people is supposed to herald a new era of space exploration. Well, maybe

ON DECEMBER 4th, at a launching pad at Cape Canaveral, in Florida, and as *The Economist* was going to press, NASA was planning the maiden voyage of Orion, America's first new type of crewable spaceship in 33 years. If all goes well, the uncrewed spacecraft will orbit the Earth twice before landing in the Pacific Ocean. But if and when Orion—or, to give it its full name, the Orion Multi-Purpose Crew Vehicle—is ready to carry passengers (something currently planned for 2021) NASA will, after a ten-year hiatus, be back in the business of flying people into space.

Orion is a replacement for the Space Shuttle, which flew for the last time in 2011. But while the Shuttle was intended to be a quotidian “space truck”, launching satellites into low-altitude orbits around Earth and ferrying people to the International Space Station, Orion marks a return to grander ambitions. To begin with, it will indeed follow the Shuttle into orbit around Earth. The ultimate intention, however, is to stick it on top of a giant new rocket called, prosaically, the Space Launch System (SLS), and use it to carry astronauts to other astronomical bodies. Some talk of the Moon, though NASA is not keen. But an asteroid, and eventually a trip to Mars, are in the agency's sights.

For all its futuristic ambitions, though, Orion is something of a throwback. The Space Shuttle did indeed look like a visitor

from the future—a winged spaceplane, rather than a cone stuck on top of a cylinder, like its predecessor, Apollo. Despite its intended use as a truck, it was right at the limit of what was technically possible. That made it ornery, delicate and expensive to maintain. Orion has no such ambitions. A cone that will sit on a cylinder is what it is—or, rather, on a series of cylinders, the topmost of which is a disposable service module full of supplies and life-support equipment, similar to the service module of the Apollo missions.

But while the generalities are the same, the details are different. Unlike Apollo, which relied on fuel cells for its electricity, Orion will have solar panels. It is significantly roomier than a cramped Apollo command module, so it can carry six astronauts, compared with Apollo's three. The cockpit takes its inspiration, at least in part, from Boeing's high-tech Dreamliner aircraft. And Orion's design is modular, making it possible to upgrade it bit by bit as better technology becomes available.

Trips to an asteroid, or to Mars, though, require more than a new spaceship. They will also need a powerful rocket, which is where the SLS comes in. This vehicle has the distinction of being the first rocket designed by a committee of politicians rather than by scientists and engineers. The law that commanded its creation, passed in 2010, specified exactly how much weight it

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had to carry into orbit, and even what kind of fuel it was to use. Wags have therefore renamed it the Senate Launch System.

Some of the politicians' suggestions are sensible. As far as possible, the law says, parts already developed for the Shuttle, and for an aborted rocket called Ares, should be used. That will be cheaper than inventing new ones. But a whiff of pork hangs over the whole thing, for the effect is to keep open factories that might otherwise have closed and also, probably, to suppress innovation.

The plan calls for several different iterations of the SLS, each more capable than the last. When the final version is ready, sometime in the 2030s, it will be an impressive vehicle, able to lift 130 tonnes into orbit. That will make it more capable than a Saturn V, the machine that took people to the Moon and which remains, to this day, the most powerful rocket ever flown.

Can you spare a buck for Buck Rogers?

Whether any of this will ever actually happen, though, is still a question. Both Orion and the SLS are expensive. Both—and especially Orion—risk becoming white elephants, for Orion has rivals.

Two other crewable craft are being developed in America at the moment: both Boeing and SpaceX are building capsules, called *CRS-100* and *Dragon* respectively, to take people to and from the space station. Dragon has already logged several trips in space, including four unmanned cargo flights to the station. Either capsule could be adapted for a deep-space mission and Elon Musk, SpaceX's boss, is known to want to go to Mars, which helps explain why Dragon's heat shield is already designed to cope with the speed of a return flight from that planet.

SpaceX also has its own family of rock- ▶▶

ets, and is planning a heavy-launch vehicle which could compete with the SLS. If that comes to fruition, it will almost certainly be cheaper than the government's machine. SpaceX has spent less than \$1 billion developing both the Dragon and the mid-sized rocket needed to take it into orbit. Officials at the Government Accountability Office guess that NASA might spend \$22 billion on Orion and the SLS by 2021, when the first crewed flight is due.

Then there is history. Apollo had a clear goal: beat the Soviets to the Moon and thus demonstrate that capitalist science was better than the communist sort. No such spur exists today, though India and China have both made noises about Moon missions. As part of the ideological knife-fight that was the cold war, America was willing to spend huge amounts of money on what was, basically, a gigantic piece of propaganda. In 1966, at the height of its pomp, NASA consumed 4.4% of the American government's spending. Today, the figure is 0.5%.

Veteran space-watchers might therefore be forgiven for being cynical about Orion's prospects. Apollo was originally (at least, in the minds of space scientists) intended to lead to a permanent Moon base. Plans to explore Venus and Mars in the 1970s came to nothing. At the end of the 1980s, George Bush senior also had plans to explore Mars. So, in the early years of this century, did his son, George Bush junior. It may be that, if its mission succeeds, the mere fact that Orion has actually flown in space will give it enough momentum to stop it being cancelled. And if China really does plan a trip to the Moon, then America may feel compelled to fight another expensive propaganda war. But it would take a brave person to bet on it. ■

Neutrino astronomy

Balloon with a view

An experiment in Antarctica may solve the mystery of cosmic rays

MEET ANITA. Strictly, ANITA III—for she is the third iteration of the Antarctic Impulsive Transient Antenna. Her job, when she is launched sometime in the next few days, will be to float, suspended from a giant balloon, over Antarctica's ice, in order to record radio waves which that ice is giving off. These radio waves are generated by neutrinos passing through the ice, making Antarctica the biggest neutrino-detection laboratory in the world.

The particular neutrinos that ANITA seeks are of extremely high energy. Where they come from, no one knows—nor, strictly speaking, is it actually known that they



Up, up and away!

exist, for ANITAS I and II, which were smaller devices, failed to find them. But theory says they should be there, generated in whatever giant explosions also create cosmic rays.

Cosmic rays are high-velocity protons, sprinkled with a smattering of heavier atomic nuclei, that fly through space until they hit something such as Earth's atmosphere, when they disintegrate into a shower of other particles. They have been known for a century, but their origin remains mysterious because, being electrically charged, their paths are bent by the galaxy's magnetic field. That means the directions they come from do not point to whatever created them.

Neutrinos, however, are electrically neutral, as their name suggests. Their paths should thus point back towards their origins. Neutrinos do not interact much with other sorts of matter, but when one of ultra-high energy does so, the result is a shower of particles travelling at speeds which exceed that of light in ice. An object travelling faster than light's speed in the medium through which it is passing will generate electromagnetic waves. These are known, after their discoverer, as Cherenkov radiation. And it is pulses of radio-frequency Cherenkov radiation, the electromagnetic equivalent of a sonic boom, which ANITA is looking for.

Once airborne under her balloon—an object made of cling-film-like plastic that, when fully inflated, will be a fifth of the size of a football stadium—ANITA will take advantage of the polar vortex, a wind in constant revolution around the pole. She will fly at an altitude of 35-40km, which will mean her antennae can see 1.5m km² of ice. Ultra-high-energy neutrinos travelling through the ice are thought to interact with it and produce Cherenkov radiation

about once per century per km², so an area of this size would be expected to yield about 40 bursts a day. ANITA will complete several laps of the continent, each lasting about 15 days. Then the balloon will be cut loose, and she will deploy a parachute and be guided back to the surface for re-use.

Astrophysicists are not the only people rubbing their mittens together in expectation of the results of this experiment. The neutrinos ANITA is looking for are far more energetic than anything produced by the Large Hadron Collider, the world's most powerful particle accelerator. That means they may obey hitherto unperceived extensions of the laws of physics. One possibility is that, among the Cherenkov-radiation-generating particles produced when a neutrino collides with the ice, there may be an occasional miniature black hole.

That would be particularly exciting, because such black holes might themselves disintegrate in a characteristic puff of radiation named after another physicist, Stephen Hawking. If Hawking radiation exists, it means black holes are not truly black—a discovery which would almost certainly win Dr Hawking a Nobel prize.

Though it is not designed to search for Hawking radiation, ANITA would probably see it if it were there. And, since Hawking radiation is created, quite literally, out of nothing (the particles it is made from emerge from the vacuum of space and then steal the energy needed to become real from the black hole itself), that would assist understanding of a very strange piece of physics indeed. ■

Disseminating science

Lighten our darkness

The revolution in academic publishing continues

PUBLISHING scientific journals used to be pretty straightforward. You received manuscripts describing researchers' latest work, ran them past a few experts in the field, typeset them, printed the result, and sold it to libraries, universities and interested individuals—often at deliciously high margins.

Not any more. Such journals, like in every other corner of publishing in the digital age, are in flux. Increasingly, publishers are competing by offering additional services that make their lives more complicated, but help authors and readers.

One such service, based on the principle of, "if you can't beat 'em, join 'em", is to let subscribers share papers of interest with their peers and colleagues, but to do so in a way that allows the publisher to ►►

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► keep control, and also to extract useful information from the process. Two of the big boys, Elsevier and Springer, do this already. Now, they are being joined by Nature Publishing Group (NPG), whose flagship magazine *Nature* is the highest-profile science journal in the world.

Starting this week, subscribers to any of NPG's 49 periodicals can create a link to any article they have legitimate access to and share it with others in any online forum. Clicking the link opens the paper (together with any annotations the sharer may have added) using software called ReadCube. This program, devised by Digital Science, a firm not at all coincidentally owned by NPG's parent company, Macmillan, lets people view the paper, but not download or print it.

A hundred media outlets, including *The Economist*, will receive the same privilege. For at least the duration of a year-long trial, links to NPG papers from these organisations' apps and websites will open the paper in question, so that those who wish to follow something up in more detail may do so.

Share and share alike

On the face of it, this move brings into the 21st century one of the two founding aims of *Nature*: "to place before the general public the grand results of scientific work". But as to the other, "to aid scientific men (sic) themselves, by giving early information of all advances made", the effect is less clear. The effort is entirely different from open-access publishing (making papers freely available to all and sundry from the outset), and detractors worry it will draw attention away from the campaign to move the whole of science publishing into the realm of open accessibility.

That concern is probably misplaced. NPG is merely making use of the new digital marketplace. Though "dark sharing", as the existing, informal circulation of papers is known, is technically a violation of copyright, publishers have turned a blind eye to it, since cracking down on it would annoy an awful lot of their readers. However, dark sharing denies publishers data about who is sharing what with whom. This is information their marketing departments would love to have and, by permitting widespread sharing, NPG's plan will harvest it.

Publishers will continue to build up their digital business parks, offering more and more services beyond article sharing. Along the way, they will try to help science itself. For example, by making papers more readily available, ReadCube and its confrères make them more likely to stimulate, and be cited in, other work. Open access it is not, but NPG's latest move looks like a useful attempt to find a compromise between the interests of authors, publishers and subscribers. ■

Animal culture

Left or right wing?

To great tits, tradition seems important

IN THE days when milk was delivered every house in Britain, enterprising great tits sometimes learned to peck through the foil bottle-tops to get at the goodies beneath. These avian pioneers were quickly imitated by others, with the result that cream-pillaging populations emerged in several parts of the country. Cream-pillaging was one of the first recognised examples of animal culture: the transmission of behaviour from one individual to another, so that it persists down the generations. But, oddly, it was never followed up experimentally in the wild, to understand the nuances of the process.

That has just changed, with the publication in *Nature* of an experiment which Lucy Aplin of Oxford University conducted in nearby Wytham Wood—probably the most intensively studied habitat on the planet. Most of the great tits in this wood are known individuals, and are fitted with transponders so that they can be followed around. Dr Aplin was thus able to track in some detail how behaviour spreads, and

also how tits, like people, often seem pressed into social conformity.

Wytham has several subpopulations of great tits, each living in its own neck of the wood. Dr Aplin captured two males from each of eight of these areas, to act as her initial experimental subjects. Instead of milk bottles, she and her colleagues used specially devised boxes that, if manipulated correctly, deliver a tasty mealworm to a tit. Each box has a sliding door at the front, painted blue on the left and red on the right. Opening it either way will yield a worm, but the captured tits did not know this. Those from two of the subpopulations were taught, by letting them watch how a savvy demonstrator bird did it, that sliding the door leftward was a rewarding behaviour. Those from three other subpopulations were taught to slide it rightward. Those from the remaining three parts of the wood were taught nothing, and acted as controls. The team then scattered the wood with boxes, 250 metres apart, and released the captured birds whence they had come.

In the areas where the released birds knew how to open the boxes, the others quickly learned to do so. After the boxes had been out for 20 days over the course of a month, three-quarters of the resident tits had opened a box at least once, almost always using the method introduced by the re-released males. In one of the three control areas, half managed it, by copying birds who had worked the mechanism out by trial and error. But in the other two controls, only a pitiful 9% and 31% of the tits opened a box even once.

These results suggest that, for great tits, traditions are easy to create. To find out how persistent such traditions are, Dr Aplin and her colleagues came back nine months later (a period in which, on average half the resident tits had died and been replaced by other individuals) and put some of the boxes out again. They found three things. First, enough tits in each area remembered the old ways well enough to raid the boxes, thus enabling others to learn how to do so. Second, the tradition of whether to open to the left or to the right was preserved. Third, tits that had moved (as some did) from an area with a different tradition changed their behaviour to conform with local practice.

Why that should be, Dr Aplin does not know. But it suggests that, like human beings, great tits are conformists at heart. ■



Red? Blue? I prefer gold



Books of the Year

Page turners

Also in this section

98 Books by Economist writers in 2014

The best books of 2014 were about the South China Sea, the fall of the Berlin Wall, Kaiser Wilhelm II, the publishing of "Ulysses" and capitalism in the 21st century

Politics and current affairs

The People's Republic of Amnesia: Tiananmen Revisited. By Louisa Lim. *Oxford University Press*; 248 pages; \$24.95 and £16.99

Twenty-five years after the bloodshed in Beijing, new details keep emerging. This reconstruction, by a correspondent for America's National Public Radio, is as important for Western readers as it is for the new Chinese generation that has grown up since 1989 and knows little of what happened.

The Tyranny of Silence: How One Cartoon Ignited a Global Debate on the Future of Free Speech. By Flemming Rose. *Cato Institute*; 240 pages; \$24.95

The culture editor of the Danish newspaper that published cartoons about the Prophet Muhammad in 2005 offers a personal account of the ensuing controversy and what it means for democracy.

Political Order and Political Decay: From the Industrial Revolution to the Globalisation of Democracy. By Francis Fukuyama. *Farrar, Straus and Giroux*; 658 pages; \$35. Profile; £25

A superstar academic, who in 1992 tried to persuade people that they had got to the end of history, returns admitting that

things are more complicated than he imagined. China has adopted a mixture of state capitalism and authoritarianism, and democratisation has failed in Russia and most of the Middle East. What is needed are high-quality political institutions; not an easy thing to build.

The Collapse: The Accidental Opening of the Berlin Wall. By Mary Elise Sarotte. *Basic Books*; 291 pages; \$27.99 and £18.99

A blow-by-blow account of the birth of modern Germany on November 9th 1989, when, at an otherwise dull press conference in East Berlin, a government spokesman said that a new law permitting East Germans more freedom to travel would go into effect immediately. It changed Europe for ever.

Age of Ambition: Chasing Fortune, Truth and Faith in the New China. By Evan Osnos. *Farrar, Straus and Giroux*; 403 pages; \$27. Bodley Head; £20

An engrossing evocation of how China turned into a country that now exports in six hours as much as it did in all of 1978. Winner of a 2014 National Book Award, it captures the atmosphere of a country which was the ultimate group-think society and how it shifted to becoming a nation of individuals, set permanently on fast-forward.

Vivid Faces: The Revolutionary Generation in Ireland, 1890-1923. By Roy Foster. *W.W. Norton*; 480 pages; \$29.95. *Allen Lane*; £20

An eloquent cultural historian of Ireland traces the quixotic character of the Irish revolution. Along the way, he teases out the many views of an artistic and bohemian generation that endlessly discussed the future of women's rights, socialism, religion and sexual liberation.

The South China Sea: The Struggle for Power in Asia. By Bill Hayton. *Yale University Press*; 298 pages; \$35 and £20

An analysis of how the South China Sea has become the test of America's strategic "rebalancing" towards Asia and of its willingness to protect its friends and allies from Chinese bullying. A battle of nerves that is vulnerable to miscalculation, misperception and sheer bad luck.

Indonesia Etc: Exploring the Improbable Nation. By Elizabeth Pisani. *W.W. Norton*; 404 pages; \$26.95. *Granta*; £18.99

A richly entertaining account of a year spent travelling around the archipelago. It takes on some big themes: democracy, decentralisation, corruption, inequality, the failings of the educational system, and radical Islam, as well as the ghosts of hundreds of thousands slaughtered as Suharto took power in 1965.

► **China's Second Continent: How a Million Migrants Are Building a New Empire in Africa.** By Howard French. *Knopf*; 304 pages; \$27.95 and £22.50

How China cosied up to African politicians, by a former Shanghai bureau chief of the *New York Times*. More than 1m Chinese migrants have moved to Africa; they work on big projects and stay on, more for the money than out of ideology.

Biography and memoir

Kaiser Wilhelm II: A Concise Life. By John Röhl. *Cambridge University Press*; 240 pages; \$24.99 and £16.99

Scholarship and authority shine through this short version of John Röhl's 4,000-page, multi-volume life of Kaiser Wilhelm, an emotionally needy, bombastic, choleric and hypersensitive man quite ill-suited to run the most powerful country in Europe.

Napoleon: A Life. By Andrew Roberts. *Viking*; 976 pages; \$45. *Allen Lane*; £30

A British historian makes full use of the treasure trove of Napoleon's 33,000-odd letters and concludes that the French emperor was a tactical military genius who made some serious strategic mistakes and was far from being a brilliant statesman.

Do No Harm: Stories of Life, Death and Brain Surgery. By Henry Marsh. *Thomas Dunne*; 304 pages; \$25.99. *Weidenfeld and Nicolson*; £8.99

In this autopsy of an obsession, Henry Marsh seeks to explain how he hates cutting into the stuff that creates thought, feeling and music but just can't stop himself. So elegantly written it is little wonder some say that in Mr Marsh neurosurgery has found its Boswell.

H is for Hawk. By Helen Macdonald. *Jonathan Cape*; 300 pages; £14.99. *To be published in America by Grove Atlantic in March 2015* A bird's-eye view of love and loss, this meditation on nature, raptors, grief and the strange life of T.H. White—English author of “The Goshawk”—was the discovery of the season. Winner of the 2014 Samuel Johnson prize for non-fiction.

Faisal I of Iraq. By Ali A. Allawi. *Yale University Press*; 634 pages; \$45 and £35 History has not been kind to King Faisal I of Iraq. Still, he played a significant role in the making of the modern Middle East and this is the fullest portrait yet of this fascinating figure.

E.E. Cummings: A Life. By Susan Cheever. *Pantheon*; 213 pages; \$26.95 Inward-looking and now unfashionable, E.E. Cummings is a tricky poet to understand. With boundless new detail gathered through meticulous research, Susan Cheever succeeds where most other biographers have failed.



Little Failure: A Memoir. By Gary Shteyngart. *Random House*; 368 pages; \$27.99. *Hamish Hamilton*; £16.99

As a boy in Russia, Gary Shteyngart was frightened of everything: telephones, snow, cold, the ceiling fan, people in fur hats. But he got over it. A deeply moving love letter to his life and everything in it, including America, Russia, literature, women and his parents whom he teases without mercy.

History

The English and Their History. By Robert Tombs. *Allen Lane*; 1,012 pages; £35 A British academic shows how being a historian of France helped him recognise that his fellow Englishmen and women have embraced pluralism and immigration for at least 1,300 years, he concludes, and they should not give it up as it is a characteristic strength.

Christendom Destroyed: Europe 1517-1648. By Mark Greengrass. *Viking*; 752 pages; \$45. *Allen Lane*; £30

A magisterial account of the birth of modern Europe, from the Reformation, which broke the dominance of the Roman Catholic church, to the Peace of Westphalia, which entrenched the idea of the nation-state.

The Most Dangerous Book: The Battle for James Joyce's "Ulysses". By Kevin Birmingham. *Penguin Press*; 417 pages; \$29.95. *Head of Zeus*; £20

A gripping account of how a banned masterpiece, James Joyce's “Ulysses”, was published in instalments in small literary magazines and then in private, limited print runs by dedicated patrons (most of them women) who had to smuggle copies into America and Britain.

Thirteen Days in September: Carter, Begin and Sadat at Camp David. By Lawrence Wright. *Knopf*; 345 pages; \$27.95. *Oneworld*; £20

The three protagonists saw themselves as “living exemplars of prophetic tradition” and for a fortnight subjected each other to mind-numbing speeches about the rightness of each of their causes. Camp David came to naught, but for a fleeting moment it seemed as if things in the Middle East might turn out for the better.

Why Homer Matters. By Adam Nicolson. *Henry Holt*; 320 pages; \$30. *William Collins*; £25

An elegant British writer dusts down Homer for a new generation, examining in detail the character of his two epics, from the gore of “The Iliad” to the blindings of “The Odyssey”. A lesson about honour, violence and masculinity.

The Reckoning: Death and Intrigue in the Promised Land. By Patrick Bishop. *Harper*; 352 pages; \$26.99. *William Collins*; £20 A detailed reconstruction of the hunt for Avraham Stern and his small band of “Fighters for the Freedom of Israel”, better known as Lehi. Stern was among the first Zionists to mix religion and nationalism, and Patrick Bishop's book has important lessons for the modern day.

Economics and business

Capital in the Twenty-First Century. By Thomas Piketty. *Belknap Press*; 696 pages; \$39.95 and £29.95

An unlikely bestseller by a French economist, who, by looking at historical changes in the concentration of income and wealth, shows that the importance of wealth in modern economies is approaching levels unseen since before 1914. ►►

▶ **The Forgotten Depression, 1921: The Crash that Cured Itself.** By James Grant. *Simon & Schuster*; 254 pages; \$28

A study of the searing 1920s by the founder of a well-regarded financial newsletter. It sheds light on a nasty, but largely ignored, episode and demonstrates that a laissez-faire approach can cure slumps better than the government activism of the 1930s—or indeed 2008.

Science and technology

The Sixth Extinction: An Unnatural History. By Elizabeth Kolbert. *Henry Holt*; 302 pages; \$28. *Bloomsbury*; £20

Five previous extinctions wiped out plant and animal life on a huge scale; now a sixth is upon us. Is life resilient enough to withstand mankind?

Life on the Edge: The Coming of Age of Quantum Biology. By Jim Al-Khalili and Johnjoe McFadden. *Bantam Press*; 355 pages; £20

A rich and accessible account of how quantum theory is becoming part of the mainstream in biology as it begins to explain such mysteries as how migratory birds sense direction, how molecules in the air are perceived as smell and how, precisely, tadpoles lose their tails.

The Big Fat Surprise: Why Butter, Meat and Cheese Belong in a Healthy Diet. By Nina Teicholz. *Simon & Schuster*; 479 pages; \$27.99. *Scribe*; £14.99

A historical study of how fat came to be demonised, especially in America, by a mix of academics, government officials and food companies, and how the few sceptics who dared take on the fat orthodoxy have been much disparaged for their pains. Detailed in its research and eloquent in its argument, this is the year's most surprising diet book.

Being Mortal: Medicine and What Matters in the End. By Atul Gawande. *Metropolitan Books*; 282 pages; \$26. *Profile*; £15.99

A thoughtful American doctor, who gave the 2014 Reith lectures, recounts how many of his patients spend their final hours hooked up to machines, under fluorescent lights, surrounded by strangers. Far better to think through the implications and plan for the end you really want.

Culture, society and travel

Marriage Markets: How Inequality is Remaking the American Family. By June Carbone and Naomi Cahn. *Oxford University Press*; 272 pages; \$29.95 and £18.99

Asking why fewer people marry, two American legal academics show how, over the decades, economic inequality has undermined the rationality of marriage for many and weakened the family.

The Sense of Style: The Thinking Person's Guide to Writing in the 21st Century. By Steven Pinker. *Viking*; 359 pages; \$27.95. *Allen Lane*; £20

With gentle good humour, the Harvard psycholinguist explains that a good piece of writing is like the perfect soufflé appearing in a spotless kitchen at the end of a cooking show: "The messy work has been done beforehand and behind the scenes." A good read for all ages.

Lessons of Hope: How to Fix Our Schools. By Joel Klein. *Harper*; 320 pages; \$27.99.

The former chancellor of New York's department of education knows at first hand how much a child's education is linked to his or her success in life. He has much to say about his nine-year campaign to improve the city's school system and how it could become a blueprint for reform of America's education system.

Joyriding in Riyadh: Oil, Urbanism and Road Revolt in Saudi Arabia. By Pascal Menoret. *Cambridge University Press*; 250 pages; \$85 and £55

Frustrated by constant rebuffs as he tries to settle down to fieldwork in Saudi Arabia, a French anthropologist mingles instead with a group of daredevil motorcycle-riders and learns how boredom, testosterone and cheap petrol gave rise to joyful homoeroticism and petty criminality mixed with Bedouin gallantry.

The Reef, A Passionate History: The Great Barrier Reef from Captain Cook to Climate Change. By Iain McCalman. *Farrar, Straus and Giroux*; 377 pages; \$27. *Scribe*; £20

A sweeping and absorbing history of the site that UNESCO describes as "the most impressive marine area in the world", now disintegrating owing to two centuries of human impact. By a historian and social scientist at the University of Sydney.

Germany: Memories of a Nation. By Neil MacGregor. *Allen Lane*; 598 pages; £30. *To be published in America by Knopf in 2015*

The director of the British Museum follows the debate about the unending and difficult path that Germany has taken to try to come to terms with its past, and shows that it has been shaped as much by what is not remembered as by what is. An important and elegant study in the making of modern national identity.

Fiction

The Narrow Road to the Deep North. By Richard Flanagan. *Knopf*; 352 pages; \$26.95. *Chatto & Windus*; £16.99

A journey of loss and discovery set among the prisoners of war who were sent to build the "Death Railway" between Thailand and Burma during the second world war. Winner of the 2014 Man Booker prize for fiction and replete with scenes that stay with the reader long after the final page, this is the book that Richard Flanagan was born to write.

Lila. By Marilynne Robinson. *Farrar, Straus and Giroux*; 272 pages; \$26. *Virago*; £16.99
The third of Marilynne Robinson's novels to be set in Gilead, Iowa, and featuring John Ames, a Congregationalist preacher, turns to the story of Ames's late-in-life wife. A former prostitute and cleaner, Lila, in her new incarnation, learns about grace, joy and love, lessons that are imparted with no trace of sopiness. By one of the finest writers in America.

Decoded. By Mai Jia. *Farrar, Straus and Giroux*; 315 pages; \$26. *Allen Lane*; £18.99
At last, a fine Chinese novel that holds its own as a work that book-lovers with no special knowledge of China will relish. By a former member of the intelligence ser- ▶▶



► vices, “Decoded” stands out for its pace and for the sheer novelty of the tale it tells.

Arctic Summer. By Damon Galgut. *Europa Editions*; 352 pages; \$17. *Atlantic Books*; £17.99 With insight and seemingly effortless fluidity, Damon Galgut has written a beautiful and funny book that movingly captures the duality of E.M. Forster, one of Britain’s most thoughtful novelists.

Orfeo. By Richard Powers. *W.W. Norton*; 384 pages; \$26.95. *Atlantic Books*; £18.99 A 70-year-old composer in rural Pennsylvania who tries to make music eternal by sleight of genetic engineering falls foul of Homeland Security. Philosophical musing by a master storyteller whose novels often mine the peculiarities of the technological age.

No Man’s Land: Fiction from a World at War. Edited by Peter Ayrton. *Pegasus*; 504 pages; \$15.95. *Serpent’s Tail*; £25 Most people know that the first world war produced some of the finest poetry of the 20th century. A reminder that its prose writers weren’t half bad either.

Thirty Girls: A Novel. By Susan Minot. *Knopf*; 309 pages; \$26.95. *Fourth Estate*; £10.99 With a delicate touch, a masterly American writer presents a fictional account of a true story, set in Uganda, about a group of schoolgirls kidnapped by the Lord’s Resistance Army, and asks deep questions about whether innocent human beings can ever recover from being made to inflict pain—or even kill.

Family Life: A Novel. By Akhil Sharma. *W.W. Norton*; 224 pages; \$23.95. *Faber & Faber*; £14.99

A dark, funny novel about the hopes and troubles of an Indian family that relocates from Delhi to America, only to be confronted with disaster when the eldest son has a diving accident.

Fourth of July Creek. By Smith Henderson. *Ecco*; 466 pages; \$26.99. *William Heinemann*; £16.99

An intense, mesmerising book by the writer of the Chrysler advert starring Clint Eastwood and seen by millions at the 2012 Super Bowl. It uses the intimate relationship that grows up between a flawed social worker and a paranoid survivalist to explore grand themes about American culture, its winners and its losers.

Uncertain Glory. By Joan Sales. Translated by Peter Bush. Foreword by Juan Goytisolo. *Maclehose Press*; 560 pages; £20 Originally published in 1956 in heavily censored form, this novel by a Catalan writer who fought in the Spanish civil war and died in 1983 was the first to tell the story of that conflict from the point of view of the losers. A timeless classic about lost illusions, lost ideals, lost youth, now translated into English for the first time. ■

Books by Economist writers in 2014

What we wrote...

...when we weren’t in the office

Gutenberg’s Apprentice: A Novel. By Alix Christie. *Harper*; 416 pages; \$27.99. *Headline*; £13.99

A novel, set in 15th-century Germany, about technology, romance and change, by our fine-arts correspondent.

Learning with Big Data: The Future of Education. By Viktor Mayer-Schönberger and Kenneth Cukier. *Houghton Mifflin Harcourt ebook*; 58 pages; \$2.99

Our data editor, Kenneth Cukier, teamed up with an Oxford professor to explore how new areas of data analysis can improve the way students learn, teachers instruct and schools operate.

The Chief Financial Officer. By Jason Karian. *Economist Books*; 160 pages; \$25.99 and £20

A concise study of what CFOs do and why it matters, by the Economist Intelligence Unit’s former analyst of the financial-services industry.

Arik: The Life of Ariel Sharon. By David Landau. *Knopf*; 631 pages; \$35

A comprehensive biography of an imposing political and military leader, by our long-standing Israel correspondent.

The New Cold War: Putin’s Russia and the Threat to the West (Updated). By Edward Lucas. *Palgrave Macmillan*; 352 pages; \$20. *Bloomsbury*; £9.99

Since this book was first published in 2008, Russia has become more authoritarian and corrupt. Our energy editor, who also writes about eastern Europe, looks at the dangers posed by the Kremlin in the light of the Crimean crisis and the destabilisation of Ukraine.

The Snowden Operation: Inside the West’s Greatest Intelligence Disaster. By Edward Lucas. *Kindle Single*; 76 pages; \$1.55 and £0.99

Our energy editor analyses the issues surrounding the fugitive American intelligence contractor who is now living in Moscow.

The Fourth Revolution: The Global Race to Reinvent the State. By John Micklethwait and Adrian Wooldridge. *Penguin Press*; 320 pages; \$27.95. *Allen Lane*; £20

Three great revolutions brought about the nation-state, the liberal state and the welfare state. Longtime writing partners, our editor-in-chief and our Schumpeter columnist analyse how the East is challenging the West in a fourth revolution—the race to create a leaner, more efficient state.



Unhappy Union: How the Euro Crisis—and Europe—Can Be Fixed. By John Peet and Anton La Guardia. *Economist Books*; 220 pages; \$23.99 and £20

How Europe got into its current difficulties and how these can be resolved, by our Europe editor and our former Brussels correspondent and Charlemagne columnist, who is now the Middle East editor.

Brazil: The Troubled Rise of a Global Power. By Michael Reid. *Yale University Press*; 334 pages; \$32.50 and £20

Our former Americas editor, now the Bello columnist, analyses the troubled rise of a global power and looks at the challenges that lie ahead.

Don’t Start from Here: We Need a Banking Revolution. By David Shirreff. *Crunch Books*; 104 pages; £8.99

A guide to how banks, bankers and regulators should be reformed to avoid another crisis, by a former business and finance correspondent.

33 Artists in 3 Acts. By Sarah Thornton. *W.W. Norton*; 448 pages; \$26.95. *Granta*; £20 A former contributor on the contemporary-art market discusses whether being an artist today is an offshoot of entertainment, a radical form of entrepreneurship or a vocational calling like the priesthood.

Once Upon a Timepiece. By Starr Wood. *Bo Tree Books*; 178 pages; \$12.99 and £7.99

A novel about an antique watch, exploring ideas of time and the threads of history, by an Asia correspondent.

Guide to Country Risk. By Mina Toksoz. *Economist Books*; 268 pages; £15

How to identify and manage the risks of doing business across borders, by a member of the Economist Intelligence Unit’s credit-rating committee. ■



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For enquiries, interested parties may contact the following person,
by **5 December 2014**

Mrs Stalo Aristidou
Government Representative
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POTASHCORP - A FOUNDING PARTNER

The Global Institute for Food Security is pleased to announce the appointment of its new Executive Director and Chief Executive Officer.



DR. MAURICE MOLONEY

Drawing on a prolific body of work in agricultural research, plant sciences, and biotechnology commercialization, Dr. Moloney will lead the Institute and its mission to bring Saskatchewan-led solutions to the pressing issue of global food security.

Dr. Moloney joins the Institute from the Australian Commonwealth Science Industries Research Organization (CSIRO), where he was responsible for the Agriculture, Food-Nutrition and Biosecurity portfolios.

He previously served as the Director and Chief Executive of Rothamsted Research, the world's oldest agricultural research centre, and was the National Sciences and Engineering Research Council of Canada (NSERC) Chair in plant biotechnology at the University of Calgary. He was also the founder and Chief Scientific Officer of SemBioSys Genetics, a Canadian biotechnology company.

A distinguished and recognized leader in his field, Dr. Moloney has authored more than 90 original research papers, and issued over 300 scientific patents worldwide.

"We welcome Dr. Moloney - a leader who shares our commitment to addressing the challenges of global food security through advanced knowledge, research and innovation," said Dallas Howe, board chair for GIFS.

"His appointment reflects the ambitions of the Institute's founding partners and its unique research focus on food systems and crop production, contributing to food security solutions for people around the world."

The Global Institute for Food Security (GIFS) is a unique public-private partnership founded by PotashCorp, Government of Saskatchewan and University of Saskatchewan.

GIFS.ca

Economic data

% change on year ago

| | Gross domestic product | | | Industrial production | Consumer prices | | Unemployment | Current-account balance | | Budget balance | Interest rates, % | Currency units, per \$ | |
|----------------|------------------------|------|-------|-----------------------|-----------------|-------|--------------|-------------------------|----------------|----------------|-----------------------------|------------------------|----------|
| | latest | qtr* | 2014† | latest | latest | 2014† | rate, % | latest 12 months, \$bn | % of GDP 2014† | % of GDP 2014† | 10-year gov't bonds, latest | Dec 3rd | year ago |
| United States | +2.4 Q3 | +3.9 | +2.3 | +4.0 Oct | +1.7 Oct | +1.7 | 5.8 Oct | -389.2 Q2 | -2.3 | -2.8 | 2.29 | - | - |
| China | +7.3 Q3 | +7.8 | +7.3 | +7.7 Oct | +1.6 Oct | +2.1 | 4.1 Q2§ | +206.0 Q3 | +2.2 | -3.0 | 3.45§§ | 6.15 | 6.09 |
| Japan | -1.2 Q3 | -1.6 | +0.5 | -1.0 Oct | +2.9 Oct | +2.7 | 3.5 Oct | -2.5 Sep | +0.3 | -8.1 | 0.46 | 120 | 102 |
| Britain | +3.0 Q3 | +2.8 | +3.0 | +1.4 Sep | +1.3 Oct | +1.5 | 6.0 Aug†† | -147.5 Q2 | -4.5 | -4.5 | 2.02 | 0.64 | 0.61 |
| Canada | +2.6 Q3 | +2.8 | +2.3 | +3.9 Sep | +2.4 Oct | +2.0 | 6.5 Oct | -41.2 Q3 | -2.5 | -2.4 | 1.94 | 1.14 | 1.07 |
| Euro area | +0.8 Q3 | +0.6 | +0.8 | +0.7 Sep | +0.3 Nov | +0.5 | 11.5 Oct | +327.3 Sep | +2.3 | -2.5 | 0.75 | 0.81 | 0.74 |
| Austria | -0.1 Q3 | -1.6 | +0.9 | -2.2 Sep | +1.6 Oct | +1.5 | 5.1 Oct | +3.7 Q2 | +2.1 | -2.5 | 0.89 | 0.81 | 0.74 |
| Belgium | +0.9 Q3 | +1.2 | +1.1 | +3.4 Sep | -0.1 Nov | +0.6 | 8.6 Oct | +7.4 Jun | -0.3 | -3.0 | 1.05 | 0.81 | 0.74 |
| France | +0.4 Q3 | +1.1 | +0.4 | -0.3 Sep | +0.5 Oct | +0.6 | 10.5 Oct | -40.0 Sep† | -1.5 | -4.4 | 1.02 | 0.81 | 0.74 |
| Germany | +1.2 Q3 | +0.3 | +1.4 | -0.2 Sep | +0.6 Nov | +0.9 | 6.6 Nov | +281.6 Sep | +7.0 | +0.7 | 0.75 | 0.81 | 0.74 |
| Greece | +1.9 Q3 | +3.0 | +0.8 | -5.1 Sep | -1.7 Oct | -1.3 | 25.9 Aug | +3.1 Sep | +1.5 | -4.1 | 7.70 | 0.81 | 0.74 |
| Italy | -0.5 Q3 | -0.6 | -0.3 | -2.9 Sep | +0.2 Nov | +0.2 | 13.2 Oct | +34.6 Sep | +1.4 | -3.0 | 1.99 | 0.81 | 0.74 |
| Netherlands | +1.1 Q3 | +0.7 | +0.7 | -1.1 Sep | +1.1 Oct | +0.7 | 8.0 Oct | +89.9 Q2 | +9.6 | -2.7 | 0.87 | 0.81 | 0.74 |
| Spain | +1.6 Q3 | +2.0 | +1.3 | +3.7 Sep | -0.4 Nov | -0.1 | 24.0 Oct | +2.1 Sep | +0.2 | -5.7 | 1.86 | 0.81 | 0.74 |
| Czech Republic | +2.7 Q3 | +1.6 | +2.6 | +8.3 Sep | +0.7 Oct | +0.5 | 7.1 Oct§ | -0.5 Q2 | +0.3 | -1.6 | 0.73 | 22.4 | 20.2 |
| Denmark | +0.9 Q3 | +1.9 | +0.9 | -0.6 Sep | +0.5 Oct | +0.7 | 5.0 Oct | +23.6 Sep | +6.4 | -1.3 | 1.01 | 6.04 | 5.49 |
| Hungary | +3.2 Q3 | +1.9 | +3.0 | +5.2 Sep | -0.4 Oct | nil | 7.1 Oct§†† | +5.9 Q2 | +1.7 | -2.9 | 3.62 | 249 | 223 |
| Norway | +2.1 Q3 | +2.0 | +2.3 | +7.5 Sep | +2.0 Oct | +2.0 | 3.7 Sep†† | +49.2 Q3 | +11.1 | +12.1 | 1.90 | 7.03 | 6.10 |
| Poland | +3.4 Q3 | +3.6 | +2.6 | +1.6 Oct | -0.6 Oct | +0.2 | 11.3 Oct§ | -6.9 Sep | -1.1 | -3.5 | 2.60 | 3.37 | 3.09 |
| Russia | +0.7 Q3 | na | +0.6 | +3.0 Oct | +8.3 Oct | +7.6 | 5.1 Oct§ | +60.3 Q3 | +2.9 | +0.4 | 10.89 | 52.9 | 33.3 |
| Sweden | +2.1 Q3 | +1.3 | +2.0 | -4.3 Sep | -0.1 Oct | -0.1 | 7.5 Oct§ | +36.5 Q3 | +5.8 | -2.2 | 1.08 | 7.52 | 6.52 |
| Switzerland | +1.9 Q3 | +2.6 | +1.6 | -0.4 Q3 | nil Oct | nil | 3.2 Oct | +78.4 Q2 | +11.3 | +0.3 | 0.38 | 0.98 | 0.90 |
| Turkey | +2.1 Q2 | na | +3.0 | +4.1 Sep | +9.2 Nov | +8.9 | 10.1 Aug§ | -46.7 Sep | -6.0 | -2.6 | 7.98 | 2.24 | 2.04 |
| Australia | +2.7 Q3 | +1.4 | +3.1 | +3.8 Q3 | +2.3 Q3 | +2.5 | 6.2 Oct | -42.9 Q3 | -2.8 | -2.6 | 3.10 | 1.19 | 1.09 |
| Hong Kong | +2.7 Q3 | +6.8 | +2.4 | +2.2 Q2 | +5.2 Oct | +4.0 | 3.3 Oct†† | +4.6 Q2 | +0.9 | +0.8 | 1.84 | 7.75 | 7.75 |
| India | +5.3 Q3 | +8.1 | +6.0 | +2.5 Sep | +5.5 Oct | +8.0 | 8.8 2013 | -18.4 Q2 | -2.0 | -4.5 | 7.97 | 61.9 | 62.4 |
| Indonesia | +5.0 Q3 | na | +5.0 | +10.9 Sep | +6.2 Nov | +6.3 | 5.9 Q3§ | -24.0 Q3 | -3.1 | -2.3 | na | 12,299 | 11,885 |
| Malaysia | +5.6 Q3 | na | +6.0 | +5.4 Sep | +2.8 Oct | +3.1 | 2.7 Sep§ | +18.0 Q3 | +5.7 | -3.5 | 3.88 | 3.44 | 3.22 |
| Pakistan | +5.4 2014** | na | +5.4 | +1.8 Sep | +4.0 Nov | +7.3 | 6.2 2013 | -3.1 Q3 | -2.6 | -5.5 | 11.65††† | 102 | 109 |
| Singapore | +2.8 Q3 | +3.1 | +3.4 | +0.2 Oct | +0.1 Oct | +1.2 | 1.9 Q3 | +58.9 Q3 | +19.9 | +0.5 | 2.21 | 1.31 | 1.25 |
| South Korea | +3.3 Q3 | +3.7 | +3.5 | -3.2 Oct | +1.0 Nov | +1.5 | 3.2 Oct§ | +83.5 Oct | +5.5 | +0.5 | 2.68 | 1,113 | 1,061 |
| Taiwan | +3.6 Q3 | +2.6 | +3.7 | +9.0 Oct | +1.1 Oct | +1.5 | 3.9 Oct | +65.0 Q3 | +11.9 | -1.3 | 1.62 | 31.1 | 29.6 |
| Thailand | +0.6 Q3 | +4.4 | +1.4 | -2.9 Oct | +1.3 Nov | +2.1 | 0.8 Oct§ | +10.2 Q3 | +2.8 | -2.1 | 2.66 | 32.9 | 32.2 |
| Argentina | nil Q2 | +3.6 | -0.6 | -1.8 Oct | — *** | — | 7.5 Q3§ | -6.2 Q2 | -1.1 | -2.6 | na | 8.55 | 6.17 |
| Brazil | -0.2 Q3 | +0.3 | +0.4 | -3.6 Oct | +6.6 Oct | +6.3 | 4.7 Oct§ | -84.4 Oct | -3.6 | -3.9 | 12.01 | 2.56 | 2.36 |
| Chile | +0.8 Q3 | +1.5 | +2.0 | -0.2 Oct | +5.7 Oct | +4.3 | 6.4 Oct§†† | -5.0 Q3 | -1.5 | -2.2 | 4.39 | 611 | 534 |
| Colombia | +4.3 Q2 | -0.6 | +5.0 | +1.7 Sep | +3.3 Oct | +2.8 | 7.9 Oct§ | -14.9 Q2 | -4.1 | -1.5 | 6.55 | 2,281 | 1,940 |
| Mexico | +2.2 Q3 | +2.0 | +2.1 | +3.0 Sep | +4.3 Oct | +3.9 | 4.7 Oct | -25.4 Q3 | -1.9 | -3.6 | 5.96 | 14.1 | 13.2 |
| Venezuela | +1.0 Q4 | +3.6 | -3.1 | +0.8 Sep | +63.4 Aug | +62.2 | 7.0 Sep§ | +6.9 Q3 | +0.8 | -12.2 | 15.47 | 12.0 | 6.29 |
| Egypt | +3.7 Q2 | na | +2.2 | +30.4 Sep | +11.9 Oct | +10.7 | 13.1 Q3§ | -2.4 Q2 | -2.4 | -12.0 | na | 7.15 | 6.89 |
| Israel | +2.5 Q3 | -0.4 | +2.2 | +4.8 Sep | -0.3 Oct | +0.5 | 5.7 Oct | +8.5 Q2 | +2.9 | -3.1 | 2.28 | 3.98 | 3.52 |
| Saudi Arabia | +4.0 2013 | na | +4.1 | na | +2.6 Oct | +2.8 | 5.6 2013 | +139.2 Q2 | +13.1 | +1.3 | na | 3.75 | 3.75 |
| South Africa | +1.4 Q3 | +1.4 | +1.6 | +8.2 Sep | +5.9 Oct | +6.2 | 25.4 Q3§ | -18.8 Q2 | -5.2 | -4.4 | 7.47 | 11.2 | 10.3 |

Source: Haver Analytics. *% change on previous quarter, annual rate. †The Economist poll or Economist Intelligence Unit estimate/forecast. §Not seasonally adjusted. †New series. **Year ending June. ††Latest 3 months. ††3-month moving average. §§5-year yield. ***Official number not yet proven to be reliable; The State Street PriceStats Inflation Index, Oct 41.05%; year ago 18.99% †††Dollar-denominated bonds.



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The Economist Espresso

Our new daily app for smartphones

With clarity, brevity and wit,
our new daily app delivers
a stimulating shot of analysis
and insight every morning.

The
Economist

Markets

| Markets | Index Dec 3rd | % change on | | |
|---------------------------|------------------|-------------|----------------------|----------------|
| | | one week | Dec 31st 2013 | |
| | | | in local currency | in \$ terms |
| United States (DJIA) | 17,912.6 | +0.5 | +8.1 | +8.1 |
| China (SSEA) | 2,911.2 | +6.8 | +31.5 | +29.4 |
| Japan (Nikkei 225) | 17,720.4 | +1.9 | +8.8 | -4.5 |
| Britain (FTSE 100) | 6,716.6 | -0.2 | -0.5 | -5.6 |
| Canada (S&P TSX) | 14,754.1 | -1.9 | +8.3 | +1.3 |
| Euro area (FTSE Euro 100) | 1,066.6 | +0.8 | +4.6 | -6.5 |
| Euro area (EURO STOXX 50) | 3,247.7 | +0.7 | +4.5 | -6.6 |
| Austria (ATX) | 2,282.3 | -0.6 | -10.4 | -19.9 |
| Belgium (Bel 20) | 3,296.7 | +1.0 | +12.8 | +0.8 |
| France (CAC 40) | 4,391.9 | +0.4 | +2.2 | -8.6 |
| Germany (DAX) * | 9,971.8 | +0.6 | +4.4 | -6.7 |
| Greece (Athex Comp) | 1,008.0 | +3.2 | -13.3 | -22.5 |
| Italy (FTSE/MIB) | 19,978.3 | +0.2 | +5.3 | -5.8 |
| Netherlands (AEX) | 428.6 | +1.1 | +6.7 | -4.6 |
| Spain (Madrid SE) | 1,101.0 | +2.2 | +8.8 | -2.7 |
| Czech Republic (PX) | 1,019.8 | +2.4 | +3.1 | -8.6 |
| Denmark (OMXCB) | 695.5 | +0.8 | +22.9 | +10.2 |
| Hungary (BUX) | 17,281.6 | -1.5 | -6.9 | -19.5 |
| Norway (OSEAX) | 620.5 | -4.5 | +2.9 | -11.2 |
| Poland (WIG) | 53,801.7 | +1.1 | +4.9 | -6.1 |
| Russia (RTS, \$ terms) | 948.6 | -7.7 | +5.8 | -34.3 |
| Sweden (OMXS30) | 1,464.8 | +0.5 | +9.9 | -6.1 |
| Switzerland (SMI) | 9,168.4 | +1.2 | +11.8 | +1.8 |
| Turkey (BIST) | 84,915.1 | +0.8 | +25.2 | +20.2 |
| Australia (All Ord.) | 5,301.2 | -1.5 | -1.0 | -6.7 |
| Hong Kong (Hang Seng) | 23,428.6 | -2.8 | +0.5 | +0.5 |
| India (BSE) | 28,442.7 | +0.2 | +34.3 | +34.3 |
| Indonesia (JSX) | 5,166.0 | +0.6 | +20.9 | +19.6 |
| Malaysia (KLSE) | 1,758.2 | -4.6 | -5.8 | -10.4 |
| Pakistan (KSE) | 31,872.7 | +1.3 | +26.2 | +30.5 |
| Singapore (STI) | 3,303.4 | -1.4 | +4.3 | +0.5 |
| South Korea (KOSPI) | 1,969.9 | -0.6 | -2.1 | -7.1 |
| Taiwan (TWI) | 9,175.3 | +0.6 | +6.5 | +2.1 |
| Thailand (SET) | 1,594.6 | +0.2 | +22.8 | +22.7 |
| Argentina (MERV) | 9,666.3 | -4.5 | +79.3 | +36.8 |
| Brazil (BVSP) | 52,320.5 | -5.0 | +1.6 | -6.2 |
| Chile (IGPA) | 19,260.9 | -0.3 | +5.7 | -9.1 |
| Colombia (IGBC) | 11,951.1 | -4.5 | -8.6 | -22.6 |
| Mexico (IPC) | 43,112.3 | -3.5 | +0.9 | -6.2 |
| Venezuela (IBC) | 2,955.1 | -1.6 | +8.0 | na |
| Egypt (Case 30) | 9,305.0 | +0.8 | +37.2 | +33.3 |
| Israel (TA-100) | 1,314.8 | +0.8 | +8.9 | -5.0 |
| Saudi Arabia (Tadawul) | 8,801.7 | -2.8 | +3.1 | +3.0 |
| South Africa (JSE AS) | 49,857.2 | -1.0 | +7.8 | +0.8 |

The Economist poll of forecasters, December averages (previous month's, if changed)

| | Real GDP, % change | | | | Consumer prices | | Current account | | |
|---------------|--------------------|---------|-----------|-----------|-----------------|-----------|-----------------|-------------|--|
| | Low/high range | | average | | % change | | % of GDP | | |
| | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 | |
| Australia | 2.8/3.4 | 2.0/3.2 | 3.1 (3.0) | 2.8 (2.9) | 2.5 (2.6) | 2.4 (2.5) | -2.8 | -2.9 (-2.8) | |
| Belgium | 0.9/1.8 | 0.7/2.0 | 1.1 (1.0) | 1.2 | 0.6 (0.7) | 1.0 (1.1) | -0.3 (-0.9) | -0.1 (-1.1) | |
| Britain | 3.0/3.2 | 2.3/3.0 | 3.0 | 2.6 (2.7) | 1.5 (1.6) | 1.4 (1.7) | -4.5 (-4.4) | -3.9 (-3.8) | |
| Canada | 2.1/2.5 | 1.0/2.9 | 2.3 | 2.4 (2.5) | 2.0 (1.9) | 1.8 (1.9) | -2.5 (-2.6) | -2.4 (-2.3) | |
| France | 0.3/0.4 | 0.5/1.4 | 0.4 | 0.8 | 0.6 | 0.8 (0.9) | -1.5 (-1.4) | -1.4 (-1.3) | |
| Germany | 1.3/1.5 | 0.8/1.7 | 1.4 | 1.3 (1.5) | 0.9 (1.0) | 1.2 (1.4) | 7.0 | 6.5 (6.7) | |
| Italy | -0.4/-0.2 | 0.1/0.8 | -0.3 | 0.4 (0.5) | 0.2 (0.3) | 0.4 (0.5) | 1.4 (1.3) | 1.4 (1.3) | |
| Japan | 0.2/1.1 | 0.2/1.8 | 0.5 (0.9) | 1.1 | 2.7 (2.8) | 1.7 (1.8) | 0.3 (0.2) | 0.7 | |
| Netherlands | 0.6/0.8 | 0.7/1.7 | 0.7 (0.6) | 1.2 (1.3) | 0.7 (0.8) | 1.1 (1.3) | 9.6 (9.7) | 9.1 (9.5) | |
| Spain | 1.1/1.4 | 1.2/2.3 | 1.3 (1.2) | 1.7 | -0.1 (nil) | 0.4 (0.6) | 0.2 (0.3) | 0.5 (0.6) | |
| Sweden | 1.5/2.2 | 1.9/2.7 | 2.0 (2.1) | 2.4 (2.6) | -0.1 (nil) | 0.9 (1.1) | 5.8 (5.9) | 5.5 (5.9) | |
| Switzerland | 1.3/2.3 | 1.1/2.8 | 1.6 (1.5) | 1.8 (1.7) | nil (0.1) | 0.2 (0.5) | 11.3 (12.0) | 11.0 (11.6) | |
| United States | 2.2/2.6 | 2.5/3.5 | 2.3 (2.2) | 3.0 (2.9) | 1.7 (1.8) | 1.6 (1.8) | -2.3 | -2.3 (-2.2) | |
| Euro area | 0.4/1.2 | 0.8/1.6 | 0.8 | 1.1 (1.2) | 0.5 | 0.8 (0.9) | 2.3 (2.4) | 2.3 (2.4) | |

Sources: Bank of America, BNP Paribas, Citigroup, Commerzbank, Decision Economics, Deutsche Bank, Economist Intelligence Unit, Goldman Sachs, HSBC Securities, ING, JPMorgan Chase, KBC Bank, Morgan Stanley, RBC, RBS, Schroders, Scotia Capital, Société Générale, Standard Chartered, UBS

Other markets

| | Index Dec 3rd | % change on | | |
|---------------------------------|----------------------|-------------|----------------------|----------------|
| | | one week | Dec 31st 2013 | |
| | | | in local currency | in \$ terms |
| United States (S&P 500) | 2,074.3 | +0.1 | +12.2 | +12.2 |
| United States (NAScomp) | 4,774.5 | -0.3 | +14.3 | +14.3 |
| China (SSEB, \$ terms) | 279.3 | +0.6 | +11.9 | +10.1 |
| Japan (Topix) | 1,429.8 | +1.7 | +9.8 | -3.6 |
| Europe (FTSEurofirst 300) | 1,400.0 | +0.8 | +6.3 | -4.9 |
| World, dev'd (MSCI) | 1,739.7 | -0.5 | +4.7 | +4.7 |
| Emerging markets (MSCI) | 985.9 | -2.6 | -1.7 | -1.7 |
| World, all (MSCI) | 425.0 | -0.7 | +4.0 | +4.0 |
| World bonds (Citigroup) | 901.1 | -1.0 | -0.6 | -0.6 |
| EMBI+ (JPMorgan) | 702.3 | -1.0 | +7.8 | +7.8 |
| Hedge funds (HFRX) | 1,220.5 [§] | -0.5 | -0.4 | -0.4 |
| Volatility, US (VIX) | 12.5 | +12.1 | +13.7 (levels) | |
| CDSs, Eur (iTRAXX) [†] | 56.6 | -4.6 | -15.5 | -24.4 |
| CDSs, N Am (CDX) [†] | 61.5 | +1.9 | -3.4 | -3.4 |
| Carbon trading (EU ETS) € | 6.9 | -4.3 | +36.8 | +22.3 |

Sources: Markit; Thomson Reuters. ¹Total return index.

¹Credit-default-swap spreads, basis points. ²Dec 2nd.

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The Economist commodity-price index

2005=100

| | | | % change on | |
|-------------------------|----------|----------|--------------|-------------|
| | Nov 25th | Dec 2nd* | one month | one year |
| Dollar Index | | | | |
| All Items | 158.7 | 155.8 | -1.5 | -4.9 |
| Food | 176.4 | 174.3 | -0.4 | -5.2 |
| Industrials | | | | |
| All | 140.2 | 136.6 | -3.0 | -4.4 |
| Nfa ¹ | 125.7 | 124.1 | -3.7 | -21.2 |
| Metals | 146.4 | 141.9 | -2.8 | +3.9 |
| Sterling Index | | | | |
| All items | 183.5 | 181.0 | +0.5 | -0.2 |
| Euro Index | | | | |
| All items | 158.0 | 156.2 | -0.9 | +4.2 |
| Gold | | | | |
| \$ per oz | 1,199.0 | 1,199.5 | +2.5 | -2.0 |
| West Texas Intermediate | | | | |
| \$ per barrel | 73.9 | 67.1 | -13.2 | -30.2 |

Sources: Bloomberg; CME Group; Cotlook; Darmann & Curl; FT; ICCO; ICO; ISO; Live Rice Index; LME; NZ Wool Services; Thompson Lloyd & Ewart; Thomson Reuters; Urner Barry; WSJ. *Provisional

¹Non-food agriculturals.



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Murder most intricate

Phyllis Dorothy (P.D.) James, Baroness James of Holland Park, crime writer, died on November 27th, aged 94

AS HE neared the house, down the quiet autumnal streets of Holland Park in west London, Commander Adam Dalgliesh felt a shiver of apprehension. It was the same slightly nervous curiosity he experienced when entering a country church, pushing at the heavy door to find darkness, sweet with incense, that filled nave and chancel but also held, at its heart, a mystery. That was, he knew, an analogy his creator P.D. James would relish.

The season was her favourite, when the light faded early and council leaf-carts lurked like tumbrels in the parks between the borders of brown, withered plants. Her Regency house stood white and elegant among the almost leafless trees. He rang the bell, noticing as he did so that every lower window was criss-crossed with a metal grille. This world-famous author of 18 murder mysteries evidently feared for her own security. The warmth of her welcome, too, was preceded by the sound of a key turning several times in the lock.

Greetings exchanged, she led him to the drawing room for tea and shortbread. The room was as elegant as the house, white woodwork contrasting with sage-green walls and comfortably upholstered chairs in a William Morris pattern. Framed photographs showed her with George and Barbara Bush and in her ermine-trimmed

robes at the House of Lords, where since 1991 she was an energetic member. A walnut cabinet housed her collection of Staffordshire figures, and one bookcase held a complete set of "Notable British Trials". He looked for the first editions of Jane Austen, her favourite author, whose work she had happily imitated in 2011 in "Death Comes to Pemberley". But then he turned his detective's attention to the woman herself.

She sat upright, small and spry, with no need for the stick that rested by her side. Her hands, folded in her lap, were strongly veined, almost tough. An Indian silk scarf was carefully draped around a scrawny neck. She wore a heavy pendant and a large ring, each of which appeared to be a Victorian *memento mori*. From beneath her silver hair she gazed at him with an expression that combined intelligence, good humour and, vitally, detachment. These were eyes that could look unflinchingly on the corrugated pipes in a slit throat, on the gooseflesh of *rigor mortis* and on the strangely colourful coils and pouches pulled from the human abdomen during a post mortem. She had worked, after all, for some years in the forensics department at the Home Office. Long before that, too, she had been fascinated by death, looking for drowned corpses on the way to school and wondering whether Humpty Dumpty

really fell, or was pushed. She had often noticed, as Dalgliesh had, an expression of faint surprise on the faces of the dead.

The drawing room, he knew, was not her sanctum. That was the kitchen, where every morning after tea and bath she would spread out her notes and dictionaries and weave, in black biro, the intricacies of a violent crime. Rising early was a habit. Her arduous marriage, to a man who spent his last two decades shuttling between psychiatric hospitals and left her, at 44, a widow, had required her to keep working full-time in hospital administration, as a nurse and then in policing policy. Her books were a snatched joy until, in 1980, "Innocent Blood" made her a star.

Stiletto and razor

The business of writing, the obsessive, daily observation of people and things, the meticulous plotting, remained a private matter. She and Dalgliesh did not disturb each other's privacy. Since 1962, when he had first swung out of a police car in "Cover her Face", she had never described his sex life nor quoted his poetry, an odd sideline for a detective. She had let slip, however, that he was the man she would like to have been. The poetry was part of it, for she felt crime fiction was undervalued as literature. She wrote it differently, using the confined English settings she knew but introducing, as well as bloody disruption, exact science, note-perfect backgrounds and exquisitely worked motivation.

The room in which they now sat held clues enough to her activities. On a table behind her stood a bust of veiled Night, or Sleep, or Death, with closed eyes. On a small desk by the window lay a magnifying glass and a long stiletto, perhaps the very one she had used for the barrister's murder in "A Certain Justice". She had also been photographed admiring a switchblade razor, cousin perhaps to the Bellingham used for the near-decapitation of an MP in "A Taste for Death". But then almost anything might be a weapon, including, not least, a pair of hands pressed forcefully over the cornu and cartilage of the thyroid. And almost anything—a button, a fibre, a crumb—could be the single piece of physical evidence that would solve the crime.

Their conversation passed so quickly, in a gale of shared experience and enjoyment, that Dalgliesh did not notice the darkness falling. He saw it only when his hostess, drawing on the phrases of the 1662 Prayer Book deeply stored in her head, mentioned the "perils and dangers of this night", and briskly drew the damask curtains. The pages of his notebook were empty, save for a dusting of sugar from the shortbread. He had had no need to write anything, since they inhabited each other's minds; and as much as she had created him he had also, perhaps, created her. ■

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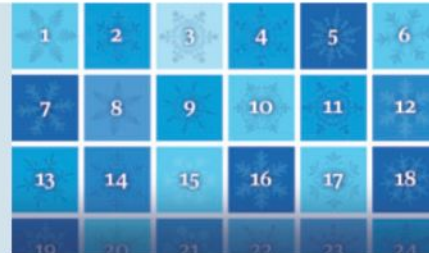
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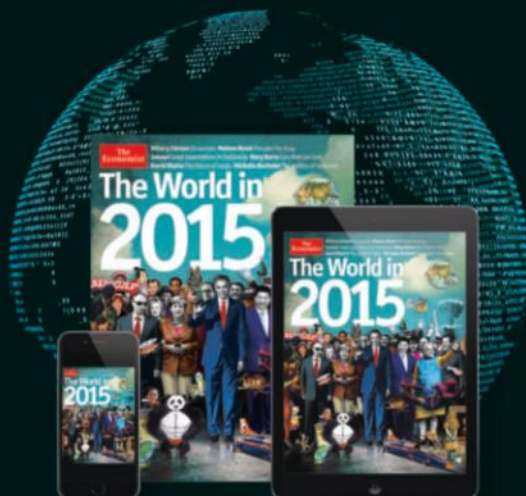


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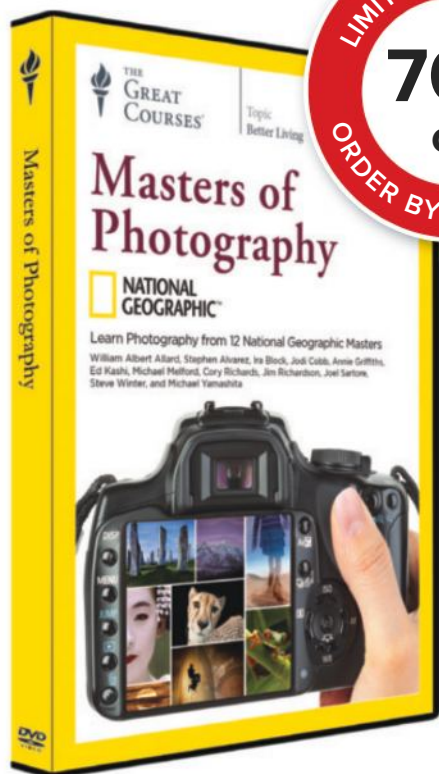




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